AN INTELLIGENCE AND EDUCATIONAL SURVEY OF THE ELEVEN-YEAR-OLDS IN THE GOVERNMENT HIGH SCHOOLS OF THE UNITED PROVINCES OF AGRA AND OUDH, INDIA.

being

A THESIS FOR THE DEGREE OF PH. D.
SUBMITTED TO THE UNIVERSITY OF EDINBURGH.

b y

SOHAN LALL.

--
-

Degree conferred 22nd June, 1945.

LIST OF CONTENTS

CHAPTER I.

Introduction.

One who is familiar with Education in India will realise that Experimental Education is in a state of infancy. Experimentation under controlled conditions is confined to a very small group of people, a group which when compared with the size of the country is almost negligible. The All India Educational Conference has a section on Experimental Education but there are very few papers read in this section on investigations actually carried out. The Indian Science Congress agreed to have a separate section for Educational Science but it never came to have an independent existence of its own. At the present moment it is combined with the Psychology section. It is a significant fact that no paper was read in the Science congress this year (1944) in this section upon an experiment conducted in Education under controlled conditions. The amount of research work produced in Experimental Education consequently is very small. There is room for more and much more.

(It would not be true to say that there is no work done. Individual workers are making their contributions but there is a lack of coordination between their attempts. In the sphere of mental testing, for example, some work has been produced by certain investigators but it is often difficult to find out what each one of these workers has done. Occasionally one sees a paper on some aspect of mental testing published in one of the few magazines on Education and Psychology. There is, however, a lack of coordination between the workers. Menzel has tried to bridge this gap. In his book "Suggestions for the use of New Type Tests" he has tried to coordinate the work done in mental testing in India.)

There are reasons which are responsible for this scarcity of literature in Experimental Education. Firstly there is, I believe, a lack of knowledge of the subject on the part of the teachers. There are very few Training Colleges which include Experimental Education in their syllabus. Those who try to teach this subject cannot possibly create an attitude of experimentation in their students within a short period of nine months, specially when they have to do so many other subjects.

Secondly there is a lack of tools in the country. For most of experimental work in Education we need tests which should be standardised on fairly large samples. The scarcity, or shall I say the absence, of such tests is felt by every worker. We cannot produce any fine piece of workmanship unless we possess the tools. These tools though not very accurate in the first instance should at any rate be workable. It will be the task of future generations to make them perfect or if that cannot be done to, at any rate, improve them.

Thirdly the importance of experimental work is not realised by those who are in a position of responsibility. Like the fate it has met in all other countries mental testing movement is faced with a considerable amount of scepticism. The scientific worker has to make his way against this opposition. Every one is not able to struggle against this obstacle successfully and quite a number lose heart very soon.

I feel that before we can experiment in Education under controlled conditions it is necessary for us to have tools and for those of us who work with school children these tools in the first instance will have to be Intelligence and Scholastic tests. Things are beginning to improve. There is an appreciation of Intelligence and Scholastic

testing.....

testing. We find an indication of this realisation of their importance in the report of the Primary and Secondary Education Reorganisation Committee appointed by the Government of the United Provinces. I may quote a few lines from the report.

> "We are, therefore, of opinion that attempts should be made ..... to substitute more valid and reliable tests for the traditional type of examination." *

> "Intelligence Tests' have been accordingly designed and it may be claimed on their behalf that if properly applied and evaluated they yield more objective, more valid, more trustworthy and complete results than do the ordinary oral and written examinations." **

> "As there are no properly standardised tests, either Individual or Group in vogue in these provinces, it is necessary to start a Central Bureau for devising ways and means of conducting intelligence and ability tests." ***

One of the recommendations of the Committee was :-

> "There shall be established a Bureau of Examinations and Tests under the Department of Education with specialists to construct Intelligence and Attainment tests."

This recommendation was accepted by the Government

---

* Primary and Secondary Education Reorganisation Committee Report, Page 88.

** Ibid Page 89.

*** Ibid Page 90.

and a.....

and a Committee was formed to bring the Bureau into existance but on account of war the committee ceased to function.

More recently, however, the Central Government has taken over mental testing in another branch of its activity. The stern reality of the war forced the Defence Department to realise the importance of this type of work. The Government of India have appointed a number of Psychological Boards for selection of officers for the Army, Navy and the Indian Air Force. These Selection Boards are doing a definite service to the cause of mental testing movement in India by giving a good deal of publicity to their methods of selection. As a result of this there is already a talk of using the tests in postwar India in the sphere of education. The report of the Central AdvisoryBoard of Education on the Post-War Educational Development in India recommends the formation of an Employment Bureaux. This Bureaux, they recommend, should employ "Aptitude and other tests." In fact they are looking forward to the Selection Boards of the Defence Department to help them in this matter. The report says in connection with these Employment Bureauxs :-

> ".....it is possible that the services of the experts now engaged in selecting Officers and N.C.O's for the Fighting Services may become available after the war and form the nucleus of the organisation required."*

These new influences are bound to give a fresh impetus to the production of tests in the country and it is the need of good standardised tests that we feel before we can get anywhere in experimentation in Education.

---

* Report by the Central Advisory Board of Education on Post-War Educational Development in India. Page88.

CHAPTER II.

The Investigation.

(So far there has been no mental testing in the United Provinces of Agra and Oudh. In fact there was, till recently, hardly any appreciation of the value of a mental survey. Even if there had been a desire for this type of investigation the means were absent. There were no tests. The whole field of education in the province lay unexplored. Even to-day there are many problems of curriculum and method to be decided by the scientific method and consequently there are enormous opportunities for any worker in this field.)

(It was considered desirable, therefore, to carry out a survey with the idea of discovering possibilities of future work. A survey is likely to suggest other problems which may be worked on later. A survey can be likened to the tapping of a field having rich reserve of minerals. We tap it and hope we will hit upon something valuable.)

With this idea in mind I planned a survey of Intelligence and the two major school subjects. It was thought at first to carry out the survey of a district but later on, on account of getting better administrative facilities and the idea of getting a bigger and a more representative sample, it was thought advisable to extend the survey to the whole province. I call it an Intelligence and Educational Survey. It consists of giving an Intelligence, an English and an Arithmetic test to all the children of 11+ in Government High Schools of the United Provinces of Agra and Oudh (henceforward called U.P.) and scrutinising the results.

There were other ideas which were responsible for the selection of this investigation. Firstly giving out

of the tests in the survey presupposes the existence of tests. As there were no tests in existence they had to be constructed. As a result of the survey, therefore, there would come into existence, it was thought, three tests (one Intelligence, one English and one Arithmetic) standardised on a fairly large and representative sample of the population of the province.

(Secondly I had always thought that it would be interesting to find out by a scientific method the comparative I.Q's of the various religions and the castes living in the province.) It would be interesting to find whether the Hindus or the Mohammadans are more intelligent. We would like to know which of the four castes (Brahmins, Kshatriyas, Vaishas and Sudras) is most intelligent and further what is the order of merit of intelligence in these castes. There are a number of popular ideas on these subjects among the population but as may be expected there is a considerable amount of prejudice influencing these ideas. The popular opinions in these matters are influenced by the likes and the dislikes of the group among which these opinions are prevelant. (A scientific investigation on the point will at any rate be free from this subjective bias. The survey could throw light on the comparative intelligence of the children of the various religions and castes.)

(The third idea was to demonstrate the practical utility of this type of work.) The Inspectors judge the efficiency of the work of the various schools when they visit them. They look at the exercise books of the children, the diaries of the teachers and listen to a few lessons. On these observations they base their judgment on the efficiency of the school. Once again the subjective estimate plays an important part in making an estimate. A survey of this type will provide the Inspector of Schools with the mean I.Qs. and the quotients in the various subjects

together with the mean Achievement Ratios of the children. These figures will help the inspector by providing an objective standard on which to base his estimate of the work of the school. It will help the inspectors further by detecting the Backward children in the schools and thus raising the question whether there is any real problem of Backward children in their circles and if so how is it going to be met ? Are the bright children doing work up to the full measure of their capacity ? If not, it will be worth while investigating whether the reason for this is the lack of proper methods of teaching or laziness on the part of the children themselves.

These were, then, the general considerations which were instrumental in the carrying out this investigation which has been called "An Intelligence and Educational Survey of the eleven-year-olds in the Government High Schools of the United Provinces of Agra and Oudh, India."

CHAPTER III.

The Field of Investigation.

A short description of the field in which this investigation was carried out would lead to a better understanding of the organisation of the experiment. The U.P. lies in the northern part of India. The major portion of the province is a plain watered by the famous river Ganges and its tributary Jumna. The total areas of the province is 112,191 square miles of which 106,248 square miles are British territory and 5,943 square miles fall within the states. The province may be divided into the following Geographical Regions :-

1. The North
2. The Tarai Region.
3. The Plains.
4. The Southern Uplands.

U.P. is the most densly populated part of India. Its total population according to census of 1931 was 49,614,833.

From the point of view of administration the whole of the province is divided into 48 districts which are grouped into 10 revenue divisions. We are concerned more with its educational administration and to give an idea of that I will quote, once again, the report of the Primary and Secondary Education Reorganisation Committee Report.

"From the point of view of educational administration the province is divided into seven circles which are as follows:-

1. Meerut
2. Agra
3. Bareilly
4. Allahabad
5. Benares
6. Lucknow
7. Fyzabad

"Each circle contains seven districts with the excep-

/tion of .....

tion of Fyzabad which has six under its control. These seven circles are under the control of Inspectors of Schools who have Assistant Inspectors to help them..... Each district has a Deputy Inspector of Schools who has a number of Sub-Deputy Inspectors of Schools under his control to help him in the administration of education in rural areas of the district. The Anglo-Vernacular Education of the circle is directly under the control of the Inspector of Schools. All the seven Inspectors of Schools are under the control of the Director of Public Instruction who has under him a Deputy Director dealing with Vernacular Education and an Assistant Director dealing with Secondary Education. For the control of girls' education the province is divided into ten circles, each under an Inspectress of Schools, who is under the Chief Inspectress of Girls' Schools. The Chief Inspectress is under the administrative control of the Director of Public Instruction. There are a few Assistant Inspectresses. But in the districts the Deputy Inspector looks after girls' education as well.

.....

"The Director of Public Instruction is under the control of the Hon'ble Minister of Education who communicates with him through the Secretary to Government. The curricula and syllabuses of secondary education are controlled by the Board of High School and Intermediate Education through a number of committees. The curricula and syllabuses of vernacular education are controlled by the Board of Vernacular Education which has a number of committees to look after the needs of verious subjects." *

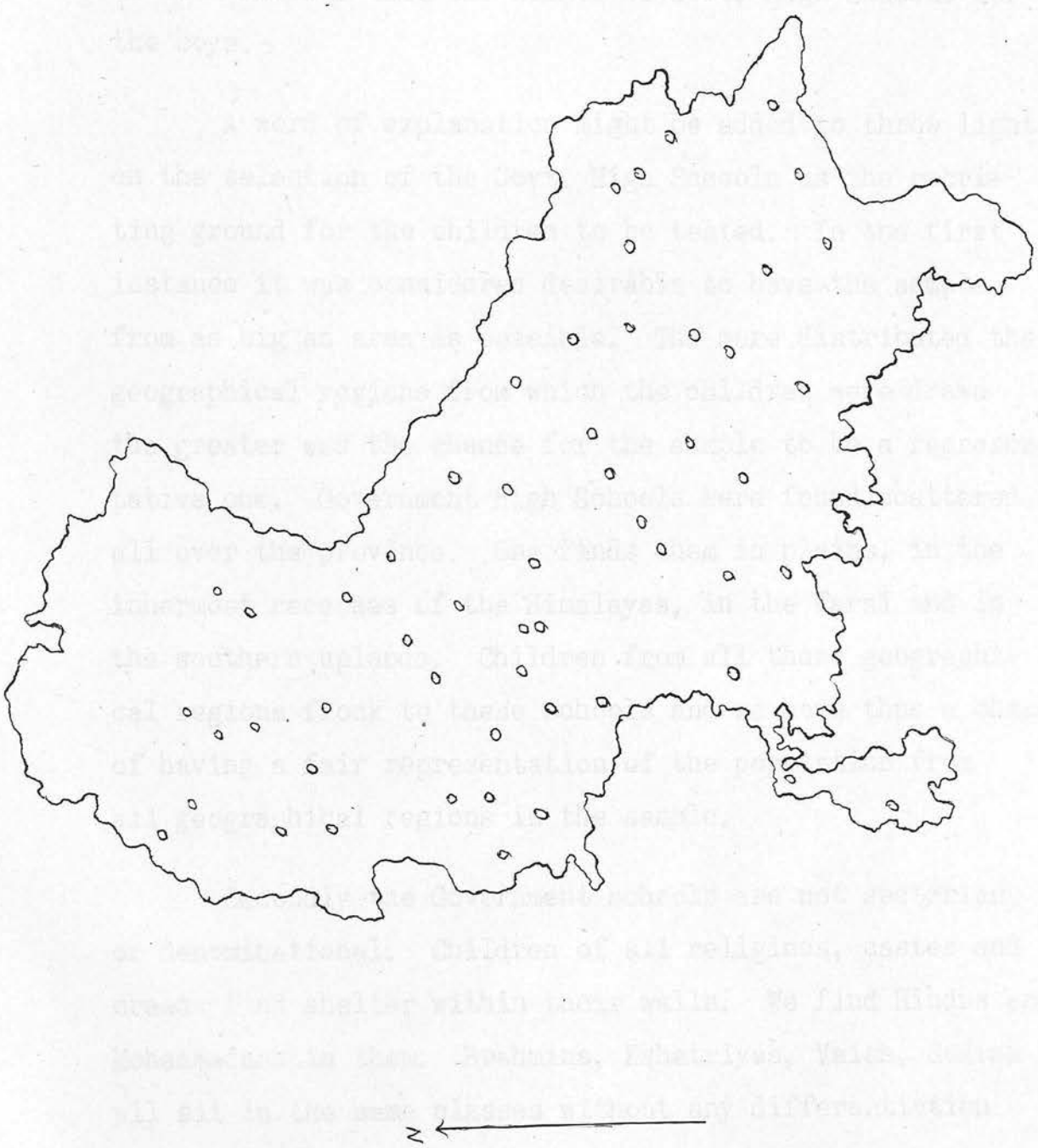
---

* Report of the Primary and Secondary Education Reorganisation Committee Page 14.

MAP OF U.P. SHOWING THE DISTRIBUTION OF SCHOOLS TESTED

Each little circle represents a School.

--



CHAPTER IV.

The Sample.

The sample used for this investigation consisted of all the eleven-year-olds of the Government High Schools of the province. Children of 58 schools from 54 different towns and cities were tested. The sample included both boys and girls. The number of girls is rather small as compared with the number of boys. This is due to the fact that the number of Government High Schools for the girls is much smaller than the number of Govt. High Schools for the boys.

A word of explanation might be added to throw light on the selection of the Govt. High Schools as the recruiting ground for the children to be tested. In the first instance it was considered desirable to have the sample from as big an area as possible. The more distributed the geographical regions from which the children were drawn the greater was the chance for the sample to be a representative one. Government High Schools were found scattered all over the province. One finds them in plains, in the innermost recesses of the Himalayas, in the Tarai and in the southern uplands. Children from all these geographical regions flock to these schools and we have thus a chance of having a fair representation of the population from all geographical regions in the sample.

Secondly the Government schools are not sectarian or denominational. Children of all religions, castes and creeds find shelter within their walls. We find Hindus and Mohammadans in them. Brahmins, Kshatriyas, Vaish, Sudras all sit in the same classes without any differentiation whatsoever.

Thirdly the Government schools have within their

/class rooms.....

class rooms children who come from all ranks of the social order. In one of the Government schools where I was teaching we had on the school roll the sons of the Chief Justice of the province and also the sons of the school peon. The professions of the fathers of the children were ascertained from the Heads of the institutions and the following list of professions would give an idea of the homes in the social scale from which the children composing the sample are drawn:-

Contractor, motor driver, leather merchant, sanitary inspector, zemindar (land lord), farmer, businessman, doctor lawyer, teacher, railway guard, police constable, station-master, watch maker, bearer (valet), government pensioner, university professor, blacksmith, photographer, broker, banker, goldsmith, priest, barber, tailor, carpenter, painter, shoe-maker, mason, accountant, civil servant, inspector of schools, labourer, watchman, Rajah and unemployed.

There has been no attempt at any arrangement of the professions mentioned above. They have been taken in a random manner from the tabulation register to show the variety of professions followed by the parents of the children. The list given above is quite representative in character.

It is evident now that the children of Government schools come from various parts of the province, they follow various religions and they belong to the various scales of the social ladder. Besides there are schools for boys and girls. All these factors go to make our sample fairly representative.

There were other reasons for the selection of the Government schools besides their being able to give a representative sample. We could have much better administrative facilities in them. These schools are under the direct control of the Director of Public Instruction. As the Director

/was willing .....

was willing to give all facilities and the heads knew that he was interested there could be no trouble whatever in administrative matters.

Besides these schools are more homogeneous in their administration and teaching. The same routine of administration is kept in every school no matter in what part of the province the school is situated. The conditions of teaching are also more or less homogeneous. The teachers are trained in the same Training Colleges and there is very little difference in the methods of teaching adopted. This homogeneity of conditions in administrative and teaching matters was regarded as an additional factor helping the equalisation of conditions in the experiment.

(We may consider now why the age of the children was chosen as 11+. The importance of this age is well recognised in the educational world today. Professor Godfrey Thomson in his book "A Modern Philosophy of Education" brings out this point. He shows the various reasons why this period is considered important. Firstly at this period of the child's life, there are the beginnings of sexual interest which now begin to be half conscious. Secondly "the change in blood-composition leads to a completely different emotional make-up of the child"* Thirdly the child at this stage is beginning to approach the time when he or she will leave the school and will follow a profession. "For these reasons" Professor Thomson goes on "the recommendation of the Hadow Report referred to above, that there should be a definite break in school-life at about the age of 11 plus, is being widely accepted to-day in one form or another. The nature of change is different in different countries, but the tendency to make such change at about this age is apparent in all." *)

---

* Thomson- "A Modern Philosophy of Education" page 199.

/Besides.....

Besides the above, another reason for selecting 11+ as the age was the fact that testing of intelligence at this age gives a fairly good indication of the future mental capacity of the child. In this connection I may quote two passages from Spearman's "Abilities of man" :-

"If once, then, a child of eleven years or so has had his relative amount of g measured in a really accurate manner, the hope of teachers and parents that he will ever rise to a much higher standing as a late-bloomer would seem to be illusory." *

"As a general summary of the chapter, g increases from birth - at first rapidly, then more and more slowly until somewhere not later than 15 - 16 years (and perhaps much earlier) its growth definitely ceases. Therefore, it normally retains this maximum level unaltered right up to the end of life (or at least to the onset of senility). The lines for different individuals run parallel to each other; that is to say, whoever is ahead of another at some early age (11 years, or perhaps still younger) will normally retain this advantage for the rest of his days." **

The above two passages bring out two points clearly. Firstly that accurate measurement of intelligence at the age of 11+ will indicate the standard of mental efficiency that a child is ever likely to reach. The hope that he will ever go much beyond the mental calibre which he possesses at the age of 11+ is not justified. And secondly that those who are above him in intelligence at the age of 11+ are likely to be ahead of him for the rest of their lives. These two facts go to show that in the intellectual world at any rate the child has at this age reached a place in

---

* Spearman -- "Abilities of Man" page 367.

** Spearman -- "Abilities of Man." page 375.

comparison with other children of his age which is likely to remain unchanged by future events. This age, therefore, is an important one from the point of view of vocational guidance also.)

(These, then, were the reasons why 11+ was considered a suitable age for this investigation.)

CHAPTER V.

The Tests Used.

Three tests were used in this investigation viz. an Intelligence test, an English test and an Arithmetic test. These tests were after the pattern of Moray House tests. The intelligence test was of the group verbal type. As there are no tests in this province with which this investigation could be carried out these three tests had to be constructed and standardised. The next few chapters, therefore, are concerned with the construction of tests and their standardisation.

The intelligence and arithmetic tests had to be constructed in Hindi and Urdu. The province is bilingual. The children read and write Hindi or Urdu. In every school the teachers have to know both languages. It was necessary, therefore, to construct these two tests in both languages. It is the same test translated as it were in both languages.

It might be mentioned here that there is not much difference between Hindi and Urdu. There is a common language which people use in everyday conversation. This is known as Hindustani. If we use more of Sanskrit words we call it Hindi and if we use more of Persian words we call it Urdu. A very good proportion of words is common to both. An attempt has been made to draw on the common words. It has been necessary in places to use words belonging to the different languages.

It might be asked why English was selected as the language to be tested and why not the mother tongue. The reason is simple. In our schools English is the more important language. Mother tongue, unfortunately, is a secondary language. In the universities all teaching is in English. In Government offices English is the language

used. In Vernacular schools the mother tongue is the first language but in the High Schools it is English that holds the place of importance. The vernacular schools are generally meant for children in the villages. As this study has been confined to Government High Schools and the language which is most important in these schools is English the language tested is also English and not the mother tongue.//

CHAPTER VI.

Organisation of the Experiment.

In an investigation like this it was impossible to move successfully unless the Director of Public Instruction cooperated. To enlist his assistance, therefore, was the first essential of success. The Principal of the Training College, Allahabad, (now the Director of Public Instructions) saw the Director and explained the whole project to him. The Director was interested and promised every help that he could give. He issued a circular letter to the Inspectors of Schools and instructed them to provide all facilities for the investigation in the schools under them.

It may be pointed out that this investigation was carried out from the Government Training College, Allahabad, on the staff of which I happened to be at that time. The whole scheme was explained to the Principal of the Training College, Allahabad, who was keenly interested in the investigation. As is mentioned above it was he who exercised influence with the D.P.I. and got the latter interested in this scheme. The circular letter of the Director of Public Instruction was really the factor which set the ball rolling.

To keep the procedure of the experiment standardised it was thought that it would be better to administer the test in all the schools on the same day and at the same time. This procedure would presume that the test was to be given by different people as it is impossible for the same man to be in all the schools at the same time and on the same day. The difficulty that we had to face was the absence of teachers who could give the tests. There were no teachers in these schools who had ever anything to do with testing. Some of them probably had heard

vague descriptions of intelligence tests but had had no training in administering them. The Training Colleges from which the teachers of the Government High Schools are drawn have no courses in Experimental Education. The teachers have, therefore, no opportunity of learning how to give a test, The first thing, therefore, was to secure a supply of teachers who could help the investigation by administering the tests. What is more these teachers should be properly distributed i.e. we should have at least one teacher in each school. As we did not have such teachers the only thing was to train at least one teacher from each school in the technique of giving the test.

It was necessary to draw a scheme for the training of these teachers. The following scheme was adopted :-

One teacher from each Government High school was to report on a fixed date at the Headquarters town of the Inspector of Schools in whose circle the school lay. On particular days thus there were a number of teachers who assembled at a given place and at a given time in the Headquarter town of the Inspectorate to which their school belonged. I went round then in a circular tour of the province visiting one Headquarter town after another and training these teachers.

The actual collecting of the teachers at the various training centres was done as follows :-

The Principal of the Training College, Allahabad, sent out a circular letter*to the various inspectors requesting them to depute one teacher from each school for the purpose of being trained. A.C.T. teacher was asked

---

* Appendix I.

for A,C.T. (Certified Teacher) is generally incharge of elementary classes and draws lower salary than a teacher who is incharge of secondary school classes. He naturally is given travelling allowance at a lower rate than the other teacher who teaches secondary school classes. The travelling allowance of these teachers was paid by the Government.

The same circular letter contained the different dates on which the final testing of the children was to be done and the Heads were requested to send any objections to the proposed scheme of examination through the teachers whom they were sending for the purpose of being trained.

The actual training of the teachers consisted in telling them briefly about the historical developments of the tests, about the fundamental principles underlying their construction, about the details of the investigation in which they were to help and about the importance of keeping strictly to the same conditions in all schools in an investigation like this. They were then shown how a test like this was to be given and then each one of them was made to give the same test under the supervision of the trainer.

After the necessary supply of teachers who could give the tests in various schools under standardised conditions was thus obtained another circular letter* was sent out to the Inspectors of schools from the Principal Training College, Allahabad, asking for the following information about the children who were to be tested :-

1. The name of the child who will be 11+ on the date of the test.
2. Class.
3. Date of birth.
4. Father's occupation.
5. First language (Hindi or Urdu).

---

* Appendix II.

The information when received from the Heads of the institutions supplied a kind of census of the children who were to be tested. It also told us how many copies of each test were to be sent to the various schools and how many of these should be in Urdu and how many in Hindi.

The requisite number of tests, then, were sent out to each school together with the instructions for administering the test.* The teachers were trained to follow the same procedure and use the same language when giving out instructions. To help them in this procedure the instructions were printed and sent out together with the test script.

The tests were sent out early enough to reach each institution in time. The actual tests were administered on the 8th, 9th and 10th of October 1941. It might be explained why these dates were selected. The schools have their first term finished by Dussehra holidays. These holidays generally come at the end of September or beginning of October. Most of the schools have their Term Examinations before the school closes for these holidays. It was considered advisable, therefore, to have the dates of the tests a few days after the reopening of the schools after these vacations. The children would have finished an examination, enjoyed about a week's holiday and would have warmed up to the usual work of the next term. The dates chosen above were the dates which came immediately after this warming up period. The schools were free from all other activities and could safely be hoped to devote three days to testing.

As our children are not used to this type of testing a Practice Test** was given to them before they were made to work on the real tests. The idea in giving this test was to familiarise them with the type of work which was

---

* Appendix III.
** Appendix IV.

coming.....

coming. The title page of the Practice Test was just as it was in the real test so that the children got used to the appearance of the test. The questions inside were to make them familiar with the new way of answering questions. This test lasted for ten minutes and was not scored.

The testing was done on the dates mentioned above in all the schools and at the same time. There was only one school in which the testing was done two days later. Due to the war the railway line up to this town was removed and though the tests were sent early enough due to some transport problem the Headmaster could not get them in time.

After the tests had been given to the children the scripts were packed by the Heads and sent back to the Principal Government Training College, Allahabad. The scripts were then marked. The marking was checked and so were the totals. The ages as calculated from the dates of birth were also checked.

Then came the tabulation work. A register* was prepared which shows the following columns :-

1. Serial Number.
2. Name.
3. Class.
4. Father's occupation.
5. Religion.
6. Score on Intelligence Test.
7. Score on English Test.
8. Score on Arithmetic Test.
9. Age.
10. Intelligence Quotient.
11. English Quotient.
12. Arithmetic Quotient.
13. Education Quotient.
14. Remarks.

---

* Appendix XXXX.

/After.....

After the scores in the various tests were tabulated the tests were standardised and the different quotients of the children were found which were posted again in the tabulation register.

CHAPTER VII.

The General Method of Constructing the Tests.

The general method employed in constructing each test, broadly speaking, is the same. It will be convenient, then, to describe the method followed, in general, in this chapter to avoid unnecessary repetition.

Before the test was constructed in each subject the range of ability to be tested was fixed. In the Arithmetic and English tests it necessitated the clear enumeration, of all the topics of the subjects which were to be included. Further it was essential to know in each particular topic the standard of achievement which the children of 11+ are expected to have. Majority of the questions in the test were framed to meet this standard. There are some questions which are based on a standard higher than the average to make head room for the brighter children. On the other end of the scale some questions are based on a standard slightly lower than the average to cater for the ability of the poorer children. An attempt has, therefore, been made to avoid the ceiling effect and also the flooring effect.

The next thing to be decided was the number of items or questions to be kept in the tests. This number must not be so small that the test finishes before the children get warmed up to the items in the test. On the other hand the items must not err on the side of being too many. In that case the danger is that the subjects are likely to suffer from fatigue, both physical and mental, before the test is over. If that happens we would introduce a new factor which is likely to vitiate the results of the test. Keeping these two points in mind it was decided to have a hundred items in each test.

/When .....

When I started framing the questions it was evident that some of these, inspite of my best efforts, may be vague or capable of being answered in more than one way. If we want to keep the marking of the test strictly objective such items are to be avoided for they would bring in a subjective element on the part of the examiner. The best test of an item being clearly worded would be to give it to the children and notice their responses. The answers of the children reveal clearly the fact whether the question is capable of being understood in more than one way by them.

Another difficulty in item construction may be that a particular question may be too difficult for the children tested or it may be too easy for them. In the former case no child may be able to answer it and in the latter every child may answer it correctly. In both cases the item is useless. In the former case it goes over the heads of the children and their inability to react to it does not give us any information about the comparative ability of the children. It does not really measure anything. On the other hand if ever child answers an item correctly the same difficulty is faced again. It does not discriminate between the abilities of the children and so is useless for our purposes. Nothing but actual trial could be a good judge of the fact whether our item is of such a nature.

We have also to keep in mind the fact that our test should contain questions of all levels of difficulty if we want it to discriminate well between the children tested. This object can best be attained after the items have been tried on a batch of children and the difficulty value of each item calculated.

An initial try out, therefore, is essential. It

is also.....

is also evident that inspite of the best attempts of the framer of the questions some questions will be found vague, some too difficult and some too easy. We will, therefore, have to reject a number of items as a result of our initial try out. It is necessary, therefore, to have more than 100 items in our initial try out if we wish to have a 100 items in our final test. How many more than a 100 are we going to have in the initial try out is a matter to be decided. To be on the safe side it was decided to have 200 items for the initial try out. We could, then, have enough number of questions at our disposal which could be rejected.

Having 200 items at our disposal we divided these into two draft tests of 100 items each. A single test of 200 items would have been too long and the factors of fatigue and boredom would have crept in. These two drafts were called Draft A and Draft B in each case.

These two drafts of each test were tried on a batch of children of 11+. This batch in each case consisted of children whose number was over 150. The exact number is mentioned in the chapters dealing with the construction of each particular test. Each batch had children from schools which were supposed to represent each level of ability viz. good, average and poor. Both boys and girls were included.

The main idea behind this initial try out was to find the difficulty value of each item and also to discover which item if any is vaguely worded. It was desired that each child should attempt every item, for only then could we get a clear idea of the difficulty value and the objectivity of each item. The children, therefore, were given unlimited time and were instructed to try every item. In the initial try out the power factor was emphasised rather than the speed factor. At the end of each draft a very easy question was put. The idea behind this was to ascer-

tain that the child has at any rate read through the last page of the test. If he had done that he was bound to answer this question.

After the draft tests were administered they were marked. Each item was assigned one mark so that the total number of marks in each draft was 100. The last easy item was not scored. The scripts in each draft were then arranged in order of merit according to the marks obtained. These scripts were divided into six approximately equal parts and an answer pattern was thus made for each draft and the difficulty value of each item was calculated.

Having obtained the difficulty value of each item selection of items was made for the final tests to be used in the actual investigation. The chief principle kept in mind in the final selection of the item was to have enough items to cater for the different ranges of ability and to have items which are clearly worded and can be objectively marked.

A word might be added about the form of test used. It wad decided to keep the test in the multiple choice form for Intelligence and English tests. On the average there are six responses in each item out of which the correct response had to be selected by the child. The number of possible responses being six the chances of guessing the correct response has been reduced considerably. The score which a child may get by guessing is reduced to a negligible amount. An attempt has been made to keep the alternative responses in each item of such a nature that a child has to exercise his brain before he can select the correct response. The correct response in each item was inserted in the alternative responses in a random manner. In some cases it was the first response in the possible answers, in some the second and so on. The exact position for the correct response in each item was decided by drawing lots.

CHAPTER VIII.

Construction of Intelligence Test.

The first thing in the construction of this test was the deciding of the range of ability on which the test was to be based. If we regard the total range of intelligence among human beings to be extending from the amount of intelligence possessed by the new born to the amount of intelligence possessed by the 16-year-old the particular range which we want to test in this investigation is the range of intelligence extending between the intelligence possessed by the child who is 11:0 and the child who is 11:11. Our attempt, then, was to frame questions which will be suited to the intelligence of the 11-year-olds. At best we could guess the difficulty value of these questions. There are no published tests for the eleven-year-olds in this country which could give one an idea of how difficult the questions in the intelligence test should be. In the construction of this test, therefore, I had to start, as it were, from the scratch. I was, however, fortunately placed in one respect. I had been familiar with the Moray House tests. I had spent three years there and constant working with these tests had given me a rough idea of the difficulty of the questions framed for the eleven-year-old in Great Britain. I kept my questions roughly on the same standard of difficulty. All this estimate of the difficulty value of the questions was purely subjective but it worked.

The next thing to decide was the various types of questions that were to be used in thetest. For this purpose I scrutinised a number of Moray House and American tests and obtained a list of the various types of questions used in them. These included instructions, inferences, analogies, opposites, classifications, mixed sentences,

mixed words, essentials, riddles, space and time relations, codes, number and letter series. As mentioned before 200 items in all were prepared on these types. These were distributed in two Draft Tests - Draft A * and Draft B**. These items were all in Hindi and Urdu and the translations of a few of them will show that they are not different from the items used in British and American tests.

As earnest attempt has been made to keep the questions based on experience which is well within the range of children of eleven years of the Government High Schools of U.P.

Here are a few translations of the items constructed:-

Instructions.

1. Write the last letter of the fifth word of this sentence .....(.....)
2. Write in the brackets the letter which occurs in 'Garm' and 'Narm' but not in 'Nagar' .....(.....)

Inferences.

READ THE FOLLOWING :-

Abid, Kareem, Mukhtar, Madan and Ramesh are five boys.

Kareem is taller than Abid.

Mukhtar is taller than Abid but smaller than Kareem

Madan is smaller than Kareem but taller than Mukhtar.

Ramesh is taller than Abid but smaller than Mukhtar.

NOW ANSWER THESE :-

Who is the tallest? ... ... (.....)

Who is the shortest? ... ... (.....)

---

* Appendix V.

** Appendix VI.

Who is the tallest but one? ... ... (.....)

Who is the shortest but one? ... ... (.....)

Analogies.

1. Light:Darkness::White:(lamp/ matches/ candle/ night/ milk/ black).
2. Tailor:Cloth::Carpenter:(Blacksmith/ shoemaker/ machanic/ shoe/ leather/ wood).

Opposites.

1. Light....(Feather/ paper/ cork/ elephant/ heavy/ thin)
2. Strength....(weakness/ illness/ medicine/ pain/ softness/ Hardness).

Classifications.

The children in these had to underline the word in brackets which belonged to the same class as the words outside the brackets.

1. Hindi, Urdu, Persian.....(Teacher/ inspector/ school/ book/ examination/ English).
2. Water, oil, ink .....(River/ bottle/ milk/ pen/ thirst/ paper).

Mixed sentences.

The children had to straighten out the sentence and to underline the first word.

1. Hot to-day is it very.
2. Road was the on there big a crowd..

Mixed words.

The children were to write in the brackets the full word after it had been straightened out.

1. RAMDAS is a city.....(.....)
2. NIDHGA is a famous person.....(.....)

Essentials.

The children had to underline the correct response in the brackets.

IT IS ESSENTIAL :-

1. In the FOREST (lion/ bear/ snake/ mud/ thorns/ trees).
2. In the FIRE (heat/ wood/ coal/ paper/ smoke/ flame).

Riddles.

I can walk)
I can fly) I am (Seaplane/ crow/ tortoise/ fish/ heron ~~heliron~~/ duck).
I can swim))

Space relations.

For this the figure on page 6 of the Final test*was used and the following questions were based on it.

1. Write the number which is in the triangle and the circle but not in the square ... .(.....)
2. Write the number which is in the circle and the square but not in the triangle.....(.....)
3. Write the number which is in the square, the triangle and the circle ....(.....)

Time relations.

For testing time relations a letter was given and questions were put on this letter which involved the finding out of time relations. Below is given the letter with a few questions on it :-

READ THIS LETTER. IT IS WRITTEN BY A BOY TO HIS FRIEND.

Allahabad.
14 March 1940.

My dear friend Mohammad,

I received your letter on Saturday last. Ramu's examination began day before yesterday i.e. on Tuesday. He has to answer five papers in all. He has one paper every day. My examination will begin on Monday next. I have to answer six papers and I shall have two papers every day. The result

---

* Appendix X.

of both of us will be published one week after the finishing of our examinations. I will see you in Cawnpore on the Sunday that will come after my result has been published but as my uncle is coming to Allahabad on the 5th of April I shall leave Cawnpore for Allahabad on Wednesday.

Your friend

Kailash.

NOW ANSWER THESE :-

1. On what day did Kailash write the letter ?
   (Monday/ Tuesday/ Wednesday/ Thursday/ Friday/ Sunday).
2. On what date did Ramu's examination begin ?
   (10th March/ 11th March/ 12th March/ 13th March 14th March/ 15th March).

Number series.

1. 2, 4, 6, 8, ..., ...
2. 919, 828, 737, 646, ..., ...

Codes.

LOOK AT THE FOLLOWING. LETTERS AND SIGNS.

T	R	K	M	N	A
÷	-	+	0	x	=

IF IN PLACE OF THE LETTERS WE USE THE SIGNS UNDER THEM WE WILL WRITE

	RAM	KA	NAM	RAT
THUS	-=0	+=	x=0	-=÷

NOW FIND OUT WHAT IS WRITTEN IN THE FOLLOWING QUESTIONS :-

1. +0- ... ... (.....)
2. x0= ... ... (.....)
3. 0=- ... ... (.....)
4. 0+=x ... ... (.....)
5. x=x+ ... ... (.....)

Letter series.....

Letter series.

In this type of question the Hindi and Urdu Alphabets were used. The children were instructed that the letters in the series came in a perticular order. They were to find out what that order was and then to write the next two letters of the series. I shall illustrate the type of question involved by using the English Alphabet. The actual questions used in the test can be seen on page 9 of the Final Hindi test.* The questions on letter series are the questions no. 96 to 100.

Illustration.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z .

THE LETTERS IN THE FOLLOWING SERIES COME IN A PARTICULAR ORDER. FIND OUT WHAT THE ORDER IS AND WRITE THE NEXT TWO LETTERS OF THE SERIES. YOU ARE NOT REQUIRED TO MENTION THE RULE BY WHICH THE WORDS ARE SELECTED. JUST WRITE THE NEXT TWO LETTERS.

1. A, C, E, G, -----, -----.

IN THE FOLLOWING QUESTIONS YOU HAVE TO WRITE TWO LETTERS ON THE LINE.

2. AB, CD, EF, ------, ------.
   PO, ON, NM, ------, ------.

The examples given above of the various types of questions used in the test are translations of the originals. A number of defects have crept in the items on account of the translations. These defects are not present in the original version. For example in question No.2 in analogies we find among the various responses two which are very much alike so far as the sound of the first part of them is concerned and they also look alike too. These

---

* Appendix X.

responses are 'shoemaker' and 'Shoe'. In Hindustani, however, this defect is not noticeable. The actual words used are 'Mochi' and 'Joota'. Similarly in the question on time relations in which a letter is used it looks rather awkward to use so many day before yesterdays and expressions like 'Sunday that will come after my result has been published'. But these expressions in the original Hindustani are quite idiomatic and are expressions which are used by people in ordinary letter writing.

The total number of items which were constructed under each type for the initial try out are shown in the table given below :-

TABLE I.

Sl.No.	Type of Item.	Total No.	Draft A	Draft B
1.	Instructions.	10	5	5
2.	Inferences.	8	4	4
3.	Analogies.	20	10	10
4.	Opposites.	20	10	10
5.	Classification.	20	10	10
6.	Mixed sentences.	20	10	10
7.	Mixed Words.	20	10	10
8.	Essentials	20	10	10
9.	Riddles	10	5	5
10.	Space relations	10	5	5
11.	Time relations.	11	11	-
12.	Number series.	10	5	5
13.	Codes	10	5	5
14.	Letter series	11	-	11
	TOTAL.	200	100	100

The two drafts were tried in the schools of Allahabad. Draft A was tried on 169 children and Draft B was tried on 177 children. The scripts were then marked giving

one mark.....

~~marked~~ ~~giving~~ one mark to each correct answer. An answer pattern was then prepared and the difficulty value of each question calculated*. The difficulty value of these 200 items was then put in the form of a frequency distribution taking a class interval of 10**. These frequency distributions were prepared separately for Draft A and Draft B. Alongside the class-interval instead of putting the tallies for each item we put the actual number of the item so that we may be able to identify each particular item together with the particular class-interval in which it falls.

A selection was then made for the final test.*** An attempt was made to include items which will provide work for the different levels of ability among the children. These items were graded in rising order of difficulty though this principle has in places been sacrificed because of the desire of keeping items of the same type together.

Two types of questions were excluded from the final test. Firstly I rejected the mixed sentences. The answer of the children clearly showed that these sentences could be straightened out in more than one ways and so were capable of being answered correctly in a number of ways. Secondly I rejected the riddles. They took a lot of space in printing. You could not get more than five questions on one page and as there were other questions of the same difficulty value available it was decided to leave these out.

The following table shows the number of items of each type used in the final test.

---

* Appendix VII.

** Appendix VIII.

*** Appendix IX.

TABLE 2.

TABLE 2

Serial No.	Type of Item.	No.
1.	Mixed words	6
2.	Opposites	13
3.	Classification	13
4.	Essentials	12
5.	Codes	5
6.	Instructions	5
7.	Inferences	8
8.	Space relations	3
9.	Analogies	15
10.	Number series	4
11.	Time relations	11
12.	Letter series	5
	Total	100

The final test was again printed in Hindi and Urdu. Both the versions are shown in Appendix X.

CHAPTER IX.

Construction of the English Test.

In constructing the scholastic tests I was faced with a new difficulty. The classes in India are not on an age basis. Children of 11+ are scattered in all classes in the school. Children of 11+ in different classes vary in their English ability. Those children who are in class X naturally know much more of the English language than those who are in class III. English ability, therefore, may be said to extend in its range from Class III to Class X. So that the test may be suitable for the age group I decided to include questions which would be suitable for all classes. The majority of children of 11+ are found in Classes VII and VIII. Those who are below or above these classes are rather small in number as compared with the number of those who are in classes VII and VIII. The bulk of the questions, therefore, are for classes VII and VIII but there are questions which are designed for the children of the lower classes and for the higher classes.

As before 200 items were constructed and these were distributed in two draft tests----Draft A* and Draft B**.

Looking at the ordinary school examinations for 11+ in India we find that the examination in English includes the testing of following :-

1. Knowledge of Text Books. These books include both prose and poetry. The usual type of question on the Text Book is, "Explain the following with reference to the context:-" and then follow passages selected from the book.

   The ideas behind this type of question are two viz. (i) to find out whether the child has read his book and (ii) does he understand the passage given.

---

* Appendix XII.

** Appendix XIII.

/2. Grammer. ....

2. Grammer. Very often we find a paper on it in the old form of examination. The usual type of question asked in this paper asks for the masculine or faminine, Singular or plural, past or future tense, comparative or superlative degrees, prepositions to be used after verbs and occasionally an easy question on parsing.

3. Dictation. A passage is read out by a teacher at dictation speed and the children are to write the passage. There are two ideas behind this test viz to test spelling and to test punctuation.

4. Composition and Translation. The children are expected to write a short description in English of some scene or experience. For translation a passage is given in Hindi and Urdu and the children are to translate it in English.

Keeping all these requirements in mind I tried to frame a test which will include as many of these as possible. First of all we had to test understanding of English language. Secondly to test grammar. Thirdly spelling and punctuation. Fourthly composition and translation. An attempt has been made to include the first three requirements in the test. The fourth has been discarded. Composition is a difficult subject to test by the new type test. Attempts are still being made to find ways and means of testing this part of English teaching. Translation was given up because of printing difficulties. Hindi and English scripts can be typed together on the same page but the method of printing Urdu passage is to use the litho system. This makes the simultaneous printing of English and Urdu printing very expensive. It is prohibitive so far as the means of a single worker like myself are concerned. There is, however, a method of printing Urdu by using type and then English and Urdu can be simultaneously printed but the children of 11+

are not.....

are not familiar with the Urdu script which the type brings out. This script is very different from the script used by the books which these children read. It was considered advisable, therefore, to leave these two topics (composition and translation) out of the test.

I may mention now what particular topics I have included in the test. The first thing to be tested viz. understanding of English can be subdivided into a number of parts. We can divide it in two major parts :-

(i) Understanding of Prose
(ii) Understanding of Poetry.

These two broad divisions can be further subdivided. Under prose we can have :-

(i) Understanding of words
(ii) Understanding of phrases
(iii) Understanding of paragraphs.

Under poetry we can have :-

(i) Understanding of stanzas
(ii) An appreciation of rhythm
(iii) An appreciation of rhyme

The second thing to be tested is grammer. The following topics have been included :-

1. Gender
2. Number
3. Tense
4. Comparative and superlative degrees.
5. Use of correct preposition after a verb.
6. Use of correct descriptive verbs.

The third thing to be tested was dictation. Under this head the following are included :-

1. Spelling
2. Punctuation.

I will give a few illustrations of the types of questions based on the topics mentioned above :-

1. Words.

1. Words.

Two types of questions were used in this. These two types are illustrated as (a) and (b).

IN THESE QUESTIONS UNDERLINE IN THE BRACKETS THE WORD OR PHRASE WHICH MEANS MOST NEARLY THE SAME AS THE WORD IN CAPITAL LETTERS :-

(a) Benares is an ANCIENT city.
(dirty/ holy/ beautiful/ old/ healthy)

(b) ASCEND..(to agree/ to reject/ to rise/ to end/ to ask).

2. Phrases.

READ THE FOLLOWING PASSAGE CLEARLY.

The new master of Delhi, Akbar, was only thirteen when he succeeded to the throne but he soon showed that he was no ordinary boy.....

NOW UNDERLINE THE CORRECT ANSWER IN THE BRACKETS.

(a) In the above passage 'succeeded to the throne' means
(became the king/ approached the capital/ won a war/ walked on thorns/ decorated the throne).

(b) 'No ordinary boy' means
(clever boy/ naughty boy/ lazy boy/ cruel boy/ weak boy).

3. Paragraphs.

(Draft A, questions 1 to 4).

READ THE FOLLOWING CAREFULLY :-

Long ago there lived in the forest a sage. He was old. All his hair was white, but he had lost none of his teeth. All day he read holy books.

THE FOLLOWING QUESTIONS ARE ON WHAT YOU HAVE READ. AFTER THE QUESTIONS THERE ARE A NUMBER OF ANSWERS IN THE BRACKETS. ONLY ONE OF THESE ANSWERS IS CORRECT. THE OTHERS ARE WRONG. UNDERLINE THE CORRECT ANSWER IN THE BRACKETS.

/(a). Who....

(a) Who lived in the forest ?

(a lion/ a tiger/ a robber/ a snake/ a sage).

(b) When did he live in the forest ?

(yesterday/ last year/ long ago/ two years back/ never).

4. Stanzas.

(Draft B, question Nos. 175 to 178)

READ THE FOLLOWING CAREFULLY.

No stir in the air, no stir in the sea,
The ship was as still as she could be;
Her sails from heaven received no motion,
Her keel was steady in the ocean.

NOW UNDERLINE IN THE BRACKETS THE CORRECT ANSWER TO EACH OF THE FOLLOWING QUESTIONS.

(a) Why was the ship still ?

(because the crew did not work/ the sea was calm/ the ship was damaged/ the abbot was praying/ it was night)

(b) What kind of a ship was it ?

(a steamship/ a sailing ship/ a motor ship/ a modern ship/ a destroyer).

5. Rhythm.

(Draft B Qns. No. 163 to 170)

IN EACH OF THE FOLLOWING QUESTIONS UNDERLINE IN THE BRACKETS THE WORD THAT FITS BEST THERE. IT WILL HELP YOU IF YOU REMEMBER THAT YOU ARE ABOUT TO READ EIGHT LINES OF POETRY.

There (dwelt/ bathed/ swam/ fished/ rowed) a miller hale and bold,
(In/ On/ Beside/ By/ Above) the river Dee,
He wrought and sang from (morning/ morn/ evening/ afternoon/ midday) to night;
No larke more blithe then (he/ him/ it/ they/ then),

And this.....

And this the (tune/ rhyme/ metre/ burden/
beauty) of his song
For ever (may/ will/ might/ can/ used to) be,
I envy (nobody/ none/ all/ some/ few) no, not I,
And nobody (will laugh at/ talks about/ envies/
is fond of/ dislikes) me.

6. Rhyme.

(Draft A, Qns. No. 54 to 58)

IN EACH OF THE FOLLOWING LISTS OF WORDS TWO AND ONLY TWO OF THE WORDS RHYME; THAT IS; THEY END IN THE SAME SOUND. UNDERLINE THESE TWO WORDS WHICH RHYME.

EMAMPLE: Hill/ ball/ him/ tap/ tall.

"ball"and "tall" have been underlined because they rhyme with each other.

NOW DO THESE.

1. boy/ play/ my/ hurry/ way.
2. far/ door/ there/ here/ dear.
3. round/ blend/ blind/ hid/ ~~dear.~~ *hound.*
4. weight/ west/ sight/ east/ fright.
5. inn/ earn/ corn/ barn/ morn.

7. Gender.

IN EACH OF THE FOLLOWING QUESTIONS WRITE IN BRACKETS THE FEMININE OF THE WORDS IN CAPITAL LETTERS.

1. BACHELOR .....(.....)
2. BOY.....(.....)
3. BROTHER.....(.....)

8. Number.

WRITE IN BRACKETS THE PLURAL OF THE WORD IN CAPITAL LETTERS.

1. CHILD.....(.....)
2. SHEEP.....(.....)
3. WOMAN.....(.....)

9. Tense.

9. Tense.

(Draft B. Qns. No. 115 to 124).

IN EACH OF THE FOLLOWING QUESTIONS UNDERLINE THE WORD OR PHRASE IN BRACKETS WHICH FITS BEST THERE.

1. Hari (go/ goed/ went/ did goed/ vent) to the station yesterday.
2. This tree(grew/ growed/ grow/ grown) last year.

10. Comparative and Superlative Degrees.

(Draft B, Qns. No. 125 to 129)

1. Of all the boys Suresh was (less/ more less/ least/ little/ most least) in height.
2. There are (many/ more/ most/ much/ very much) boys here to-day than there were yesterday.

11. Prepositions after a verb.

(Draft A, Qns. No. 24 to 33)

IN EACH OF THE FOLLOWING QUESTIONS UNDERLINE THE WORD OR PHRASE WHICH FITS THERE.

1. Hasan Ali entered the library, pulled a chair and sat (on/ upon/ at/ under/ with) the table.
2. Mohan was married (with/ to/ of/ from/ together) Sheila.

12. Descriptive verbs.

(Draft A, Qns. No. 34 to 41)

IN EACH OF THE FOLLOWING SENTENCES UNDERLINE THE WORD THAT BEST FITS THERE.

1. Dogs (shout/ speak/ bark/ roar/ croak).
2. Birds (roar/ shout/ cry/ sing/ speak).

13. Spelling.

(Draft A, Qns. No. 9 to 18).

IN EACH OF THE NEXT QUESTIONS FIND OUT WHAT THE WORD UNDERLINED SHOULD BE AND THEN WRITE IT

CLEARLY SPELT IN THE BRACKETS.

1. My father's brother is my un e. .....(.....)
2. The boy fell down because he was run g very fast.....(.....)

14. Punctuation.

IN EACH OF THE BRACKETS IN THE FOLLOWING QUESTIONS UNDERLINE THE PUNCTUATION WHICH IS CORRECT. ONLY ONE MARK SHOULD BE UNDERLINED.

1. On Sunday the schools are closed (, / ; / . / ! / ? / :-)
2. Are you going home (, / ; / . / ! / ? / :-)

The following table gives the number of items used in each sub-head in the test :-

TABLE 3.

S.No.	Sub-head.	No. in Draft A.	No.in Draft B.	Total
1.	Words.	20	20	40
2.	Phrases	-	6	6
3.	Paragraphs	8	10	18
4.	Stanzas	-	8	8
5.	Rhythm	12	8	20
6.	Rhyms	5	5	10
7.	Gender	10	10	20
8.	Number	7	8	15
9.	Tense	-	10	10
10.	Degrees	5	5	10
11.	Prepositions	10	-	10
12.	Descriptive verbs	8	-	8
13.	Spelling	10	10	20
14.	Punctuation	5	-	5
	Total	100	100	200

Draft A was tried on 151 children and Draft B on 151 too. The scripts were marked as before and an answer pattern was prepared. The difficulty value of each item was

calculated .....

calculated (Appendix XIV). Frequency distributions of the difficulty value of the two drafts were prepared (Appendix XV) and then the final selection of the items were made, (Appendix XVI).

In the final selection of the items only one type was left out, the testing of rhythm. It was found that the different lines of poetry showed widely differing degrees of difficulty and it was difficult to place them all together if the test was to remain in increasing order of difficulty.

As a whole the test was found to be deficient of very easy items. There were not enough questions for the children of poorest ability. Six questions were newly constructed which were supposed to be very easy. Three of these were expected to be in the 90 - 99 interval of difficulty value and three in the 80 - 89 interval. This difficulty value of these items was graded. The six questiones newly framed were these :-

Give the plural of :-

1. Man (Final test Qn.No. 24)
2. Boy (" " " " 25)

Give the faminine of :-

3. King (" " " " 52)
4. Father (" " " " 53)

Give the meaning of :-

5. Pretty (" " " " 72)
6. Small (" " " " 73)

The questions in the final test come in increasing order of difficulty. This gradation has been slightly sacrificed, as in Intelligence Test, to the principle of orderly arrangement. Questions of the same type have been kept in the same place and as such some questions does not exactly follow the rule of increasing order of difficulty.

/The final.....

The final test which was used for the investigation is given in Appendix XVII. A table is given below showing the number of questions used in the final test under each topic.-

TABLE 4.

S.No.	Topic	No. of questions
1.	Words	10
2.	Phrases	3
3.	Paragraphs	12
4.	Stanzas	7
5.	Rhym	9
6.	Gender	5
7.	Number	11
8.	Tense	8
9.	Degrees	6
10.	Prepositions	4
11.	Descriptive verbs	8
12.	Spelling	13
13.	Punctuation	4
	Total	100

CHAPTER X.

Construction of Arithmetic Test.

This test is not in the shape of a multiple choice test. Like other tests it is framed after the pattern of Moray House Arithmetic tests. The children have to write the answer of the questions given in the space provided for the answer.

The test is divided in two parts, Part I and Part II. Part I has questions in which the children have to do computation in straight simple sums. Part II has questions in the form of problems.

Both the parts are timed separately. Half an hour is given for the whole test and each part is to be finished in 15 minutes. This test again has been prepared in Hindi and Urdu. An attempt has been made to keep the words used in the two tests the same so far as possible. The numbers used are written in English. This procedure is in conformity with the practice followed in all High Schools of the province. While doing Arithmetic children write the steps of the method in a particular sum in their language (i.e. Hindi or Urdu) but write the numbers in English.

In this test 210 items were prepared initially out of which a hundred items were selected for the final test. The following table shows the number of items as distributed in the two drafts.

TABLE.

Drafts.	Part I.	Part II.	Total.
A	55	50	105
B	55	50	105
Total	110	100	210

Part I in both drafts has questions which are already arranged in the form in which the question has to be solved. A single word on the top tells the child what to do e.g.

1.	2.	3.	4.
ADD	SUBTRACT	MULTIPLY	DIVIDE
4 1	8 5 7	4 0 3 2	3/9 6 3
3 4	3 5 2	4	
2 2			

In Part II the questions are not so arranged but the whole question is written out in words e.g.

1. Add 7, 9, and 28 ..... ---------
2. Subtract 19 from 27 ..... ---------

Part II includes a number of problems also.

TOPICS INCLUDED IN THE TEST

In Part I only the questions on the four fundamental rules have been included. It has questions on addition, subtraction, multiplication and division. These four rules include questions on the following topies :-

1. Four rules applied to simple numbers.
2. " " " " money.
3. " " " " weight.
4. " " " " length.
5. " " " " time.
6. " " " " decimals.

In Part II questions were included on the four fundamental rules applied to :-

1. Numbers.
2. Vulgar fractions.
3. Decimal fractions.
4. Questions on tables of money, weight, length and time.
5. Sums given in words to be written in figures.
6. Questions involving square roots.
7. Problems.

/I will .....

I will give a few illustrations of the questions used in the two drafts :-

PART I

ADD

1.	2.	3.
41	12	351
34	75	643
22	63	276
	84	904
		182

SUBTRACT

1.	2.	3.
857	8423	950451
352	7256	735746

MULTIPLY

1.	2.	3.
4032	6758	679
4	6	70

DIVIDE

1.	2.	3.
3)963	5)24270	7)44163

ADD

1. (Money)			2. (Length)		3. (Time)	
Rs.	as.	p.	Yds.	Girah.	Hrs.	Mts.
12	5	3	12	5	23	45
9	3	6	7	7	52	36
			24	4	10	11

4, (Weight)

Seers.	Chattaks
17	9
9=	7
3	3

SUBTRACT

1. (Money)

Rs.	as.	p.
7	12	9
5	8	6

2. (Length)

Ft.	in.
9	6
5	9

3. (Time)

Mts.	Sec.
32	13
12	43

4. (Weight)

Maunds.	Seers.
22	3
17	39

DIVIDE

1. (Money)

Rs.	as.	p.
4) 24	13	4

2. (Length)

Miles	furlongs.
6) 19	4

3. (Time)

Yrs.	Months
5) 6	3

4. (Weight)

Maunds	Seers
8) 41	16

DECIMALS

1. ADD	2. SUBTRACT	3. MULTIPLY	4. DIVIDE
31.4	31.08	37.5	7) .84
26.8	24.19	8	
45.9			
52.7			

A few illustrations will now be given of the kind of questions used in Part II of the two drafts. As these questions are in Hindi and Urdu the illustrations are only translations from the the original.

/PART II.

PART II.

Simple addition and subtraction.

1. Add 3, 6, 15 .....---------.
2. If we take 19 out of 27 what is the remainder?
---------.

Vulgar Fractions.

1. Add 1/2, 1/4, and 3/4 .....---------.
2. Subtract 1/2 from 5/8 .....---------.
3. Out of 2/3, 1/2, 3/4, and 1/3 which is the biggest?
---------.
4. What part is 4 annas of One rupee and 4 annas?
---------.

Decimal Fractions.

1. Add 2.4, 3.6 and.9 .....---------.
2. Subtract .8 from 1.2 .....---------.
3. What is .5 of eight annas ?.....---------.
4. Change .25 into a vulgar fraction.....---------.
5. Convert 3/5 into a decimal fraction.....---------.

Tables.

1. How many pies are there in a rupee ?....---------.
2. How many paos are there in five seers?..---------.
3. How many yards are there in a mile ? ...---------.

Sums to be written.

1. Write in figures "Ten thousand sixteen".---------.

Square Root.

What is the number which multiplied by itself will give 121 ? .....---------.

Problems.

1. A boy bought a book for 4 annas 6 pies, an exercise book for 1 anna 3 pies and a pencil for 9 pies. How much did he spend in all ?.....----as---p.
2. If you can buy 12 oranges for 15 annas what is the the price of 4 oranges ? .....------as4.

/3. I bought.....

3. I bought five seers of rice and got six annas back out of a rupee. What is the price of rice per seer?.....-----as.

4. 9 rupees and 12 annas were divided between two boys in such a way that the elder gets double the amount of the younger. What did the elder get?.....Rs.-------as.------.

T he above are four typical examples from the 100 questions used in the two drafts used for the initial try out.

The table below gives the distribution of different types of questions used in the two drafts:-

TABLE 5.

S.No.	Type.	Draft A.	Draft B.	Total.
	ADDITION.			
1.	Numbers	3	3	6
2.	Money	6	2	8
3.	Weight	3	4	7
4.	Length	1	3	4
5.	Time	1	1	2
6.	Decimals	-	1	1
	SUBTRACTION.			
7.	Numbers	4	4	8
8.	Money	4	2	6
9.	Weight	1	3	4
10.	Length	2	3	5
11.	Time	2	-	2
12.	Decimals	-	1	1
	MULTIPLICATION.			
13.	Numbers	5	5	10
14.	Money	5	1	6
15.	Weight	3	3	6
16.	Length	-	2	2
17.	Time	-	-	-
18.	Decimals	1	3	4

/DIVISION.

	DIVISION.			
19.	Numbers	6	3	9
20.	Money	3	2	5
21.	Weight	-	4	4
22.	Length	3	-	3
23.	Time	1	1	2
24.	Decimals	1	4	5
	Total	55	55	110

TABLE 6.

Showing distribution of various types of items in Part II.

S.No.	Type	Draft A.	Draft B.	Total
1.	Numbers	3	3	6
2.	Vulgar Fractions	7	7	14
3.	Decimal "	5	5	10
4.	Tables	7	7	14
5.	Square roots	2	2	4
6.	Problems	24	24	48
	Total	50	50	100

Both the drafts* were, as before, given an initial try on a group of 176 eleven-year-old children. The scripts were marked and an answer pattern** for each draft was prepared. The difficulty value of each item was calculated and a frequency distribution of these difficulty values was prepared.***

In the final selection of items**** certain types of questions were left out e.g. there are no sums on addition on time and decimals. This was due to the fact that such items did not have a suitable amount of difficulty value to fit into the graded order of difficulty of the test.

The tables below give a distribution of the various

---

*Appendix IXX, XX.

** Appendix XXI

*** Appendix XXII

**** Appendix XXIII.

types of questions in Part I and Part II of the Final Test.

The Final Test itself is contained in Appendix XXIV.

TABLE 7.

FINAL TEST PART I - (Distribution of Items)

S.No.	Type	No. in the test.
ADDITION.		
1.	Numbers	1
2.	Money	3
3.	Weight	4
4.	Length	4
5.	Time	-
6.	Decimals	-
SUBTRACTION.		
7.	Numbers	2
8.	Money	3
9.	Weight	-
10.	Length	3
11.	Time	1
12.	Decimals	1
MULTIPLICATION.		
13.	Numbers	4
14.	Money	4
15.	Weight	3
16.	Length	-
17.	Time	-
18.	Decimals	4
DIVISION.		
19.	Numbers	1
20.	Money	3
21.	Weight	1
22.	Length	2
23.	Time	1
24.	Decimals	5
	Total	50

/TABLE 8./ FINAL TEST.....

TABLE 8.

FINAL TEST.

Showing distribution of different types of items in Pat II.

S. No.	Type	No. of tests.
1.	Numbers	2
2.	Vulgar Fractions	8
3.	Decimal Fractions	8
4.	Tables	2
5.	Sums to be written	2
6.	Square root	1
7.	Problems	27
	Total	50

CHAPTER XI.

STANDARDISATION OF THE TESTS

Under the head of standardisation in this chapter we may consider two things viz the standardisation of the procedure of the test and the standardization of the scores and obtaining of norms.

We shall take up first the standardisation of the procedure. The main idea behind standardising the procedure is that each child should be put in exactly the same situation, so far as possible. With this end in view the tests were given to the children on the same days and at the same times throughout the province. It would have been much better if the tests could have been given by the same person. But if the tests were to be given to children scattered all over the province and the intention was to give the tests on the same day and the same time it was impossible that the same person could give the test to all the children. Different testers would perforce have to be employed. We could, however, equalise conditions still. To obtain this end the various testers were trained in the technique of giving the tests and they were trained by the same person namely the investigator. These testers used the same words in giving instructions* to the children. Printed instructions were sent out to them together with the copies of tests. The same procedure was followed by each tester. We can, therefore, assume that each child was, so far as possible, put in the same situation.

The next thing is the standardising of the scores to obtain the norms. To start with a frequency distribution of raw score was prepared for each age group**. A class interval of six was used and in all there were seventeen class in ervals. There were 12 age groups viz from 11:0

---

* Appendix III.

** Appendix XXVI.

to 11:11.

to 11:11.

The following percentiles then were found* for each age group :-

95th, 84th, 50th, 16th, 5th.

We had, therefore, in all twelve of each of these percentiles. If we plot these percentiles on a graph taking ages along the axis of X and scores along the axis of Y we would get a sort of zig-zag for each set of percentiles. A line of best fit was then drawn for each one of these zig-zags by the method of least squares and we had five lines. Each one of these lines was identified with a particular I.Q. The line for the 50th percentile was identified with I.Q. 100. The line for the 84th percentile is a line for cases one σ above the 50th percentile and similarly the line for the 16th percentile is a line for cases one σ below the 50 the percentile line. The 95th percentile line is a line $\frac{2}{3}\sigma$ above the 84th percentile and similarly the 5th percentile line is a line for cases $\frac{2}{3}\sigma$ below the 16th percentile line. We have called the 50th percentile line the 100 I.Q. line. If we knew what is the σ of I.Q. distribution of the population we could identify the other lines with appropriate I.Q's.

Ref

There have been really two studies in India so far with Binet's Scale. One of these was conducted by Dr. Rice in the Punjab and the other by Dr. Kamat in Bombay presidency. The σ % of intelligence obtained by these studies vary considerably from one another. The σ of the complete sample for Dr. Rice's study has not been specifically mentioned by him but as calculated from his figures given in his study it comes to 22.75 (N = 929). The σ for the complete sample in the case of Dr. Kamat's study is 18.7 (N = 1074). Under such conditions we are not quite sure what the exact σ of the intelligence of population is. It was thought best,

---

* Appendix XXVII.

/therefore.....

therefore, to keep σ = 15 in this study. It is a convention followed by the Moray House Tests. We can, therefore, compare these tests with the other Moray House tests.

Adopting σ = 15 the 84th percentile line was called the 115 I.Q. line and the 95th percentile line the 125 I.Q. line. Similarly the 16th percentile line was called the 85th I.Q. line and the 5th percentile line was called the 75th I.Q. line*.

The other lines for I.Q's were obtained on the graph (Appendix XXIX) by interpolation and extrapolation.

In the case of English and Arithmetic tests too the σ was kept to be 15.

The corresponding quotients (Intelligence, English or Arithmetic) for a particular score at a particular age were read out from the graphs (Appendix XXIX) and a table of norms was prepared (Appendix XXX) for each test.

---

* Equations of these five lines were then found Appendix XXVIII.

CHAPTER XII.

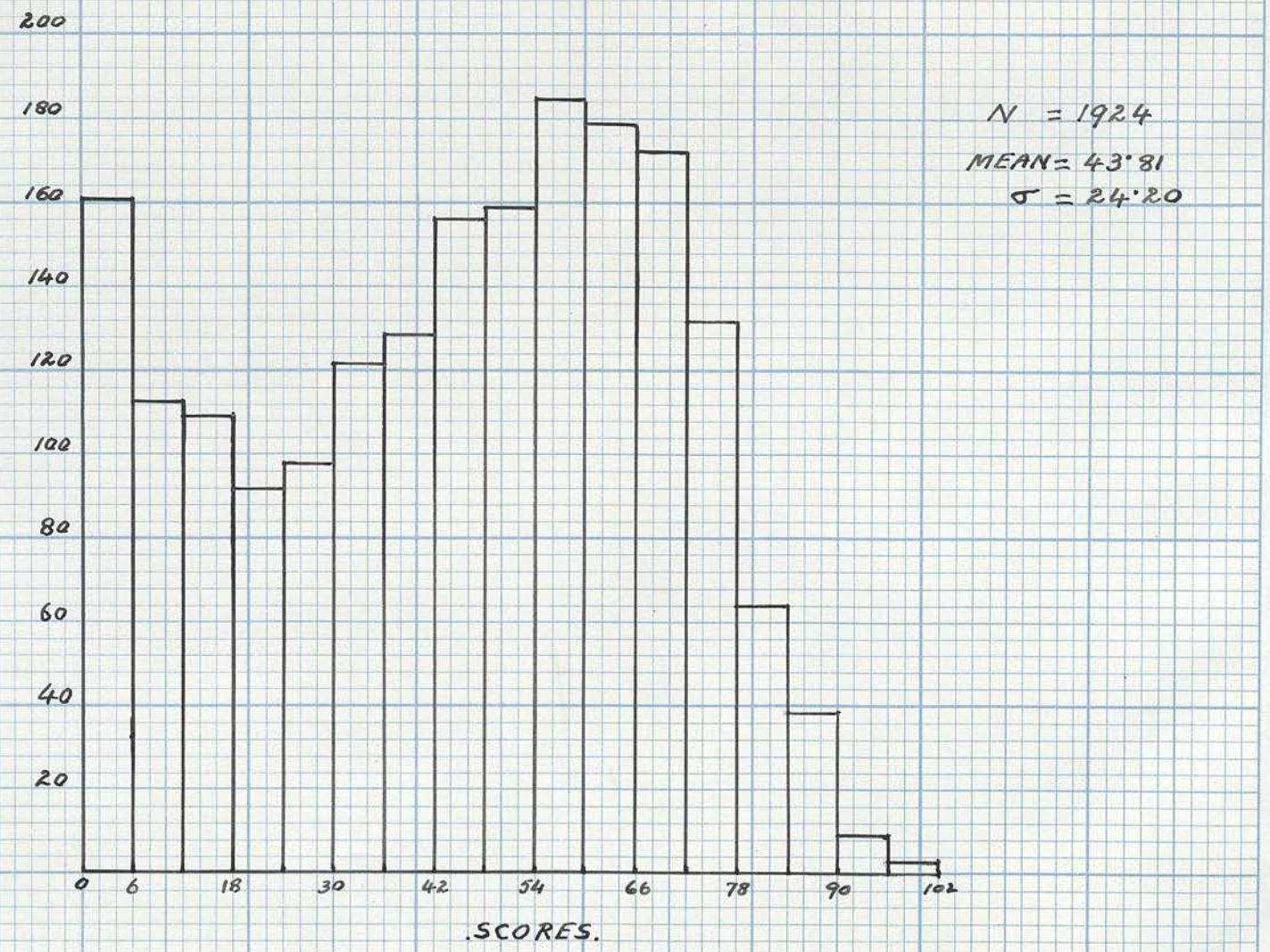
The Alteration of the Sample.

These tests were given to the children of 11+ in all the Government High Schools of U.P. The number of children tested by the various tests is shown below :-

	Test	No.
1.	Intelligence	1924
2.	English	1907
3.	Arithmetic	1911

A histogram of the raw scores of each test was drawn. These histograms are given below :-

RAW SCORE DISTRIBUTION OF INTELLIGENCE TEST

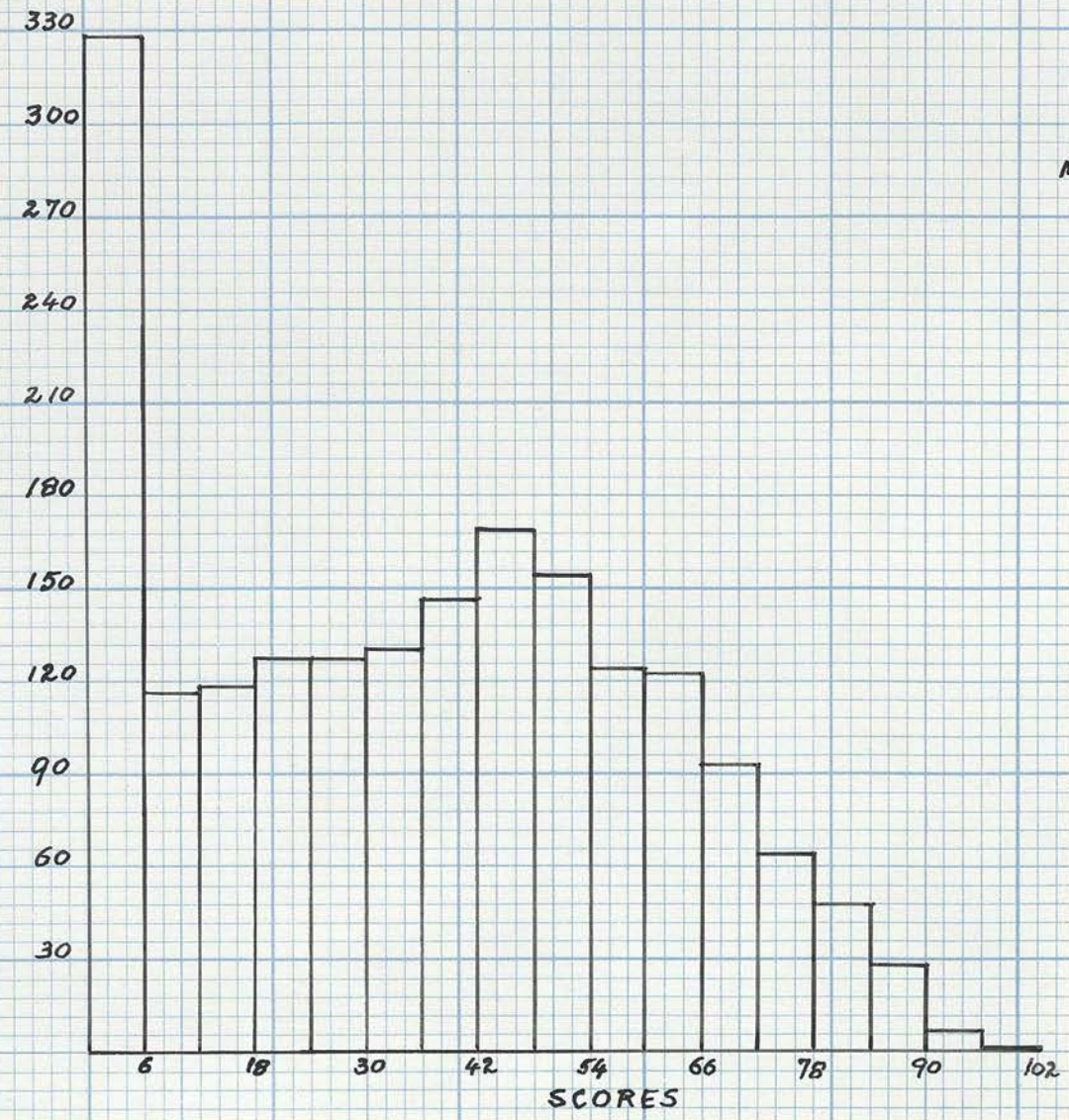


N = 1924

MEAN = 43·81

σ = 24·20

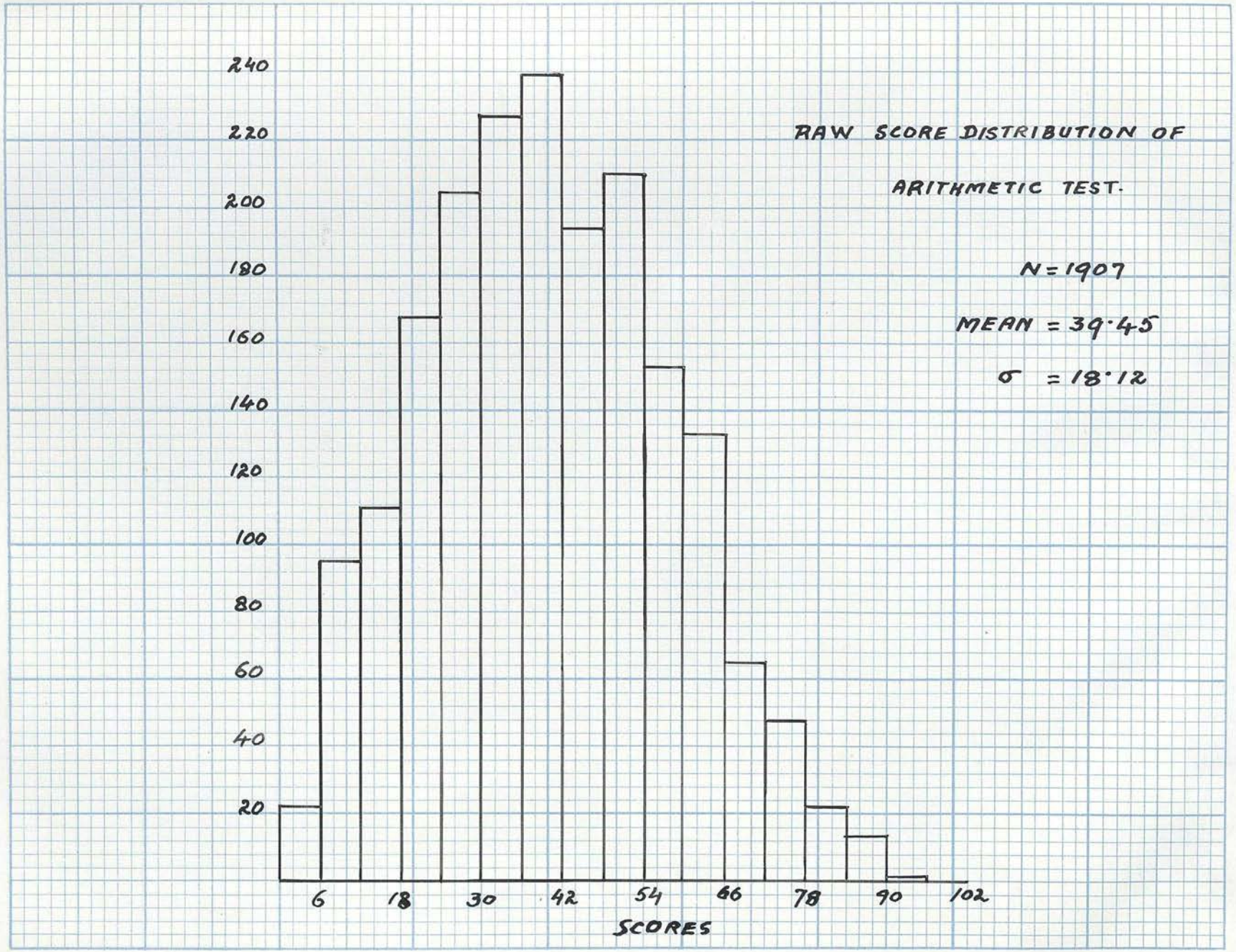
RAW SCORE DISTRIBUTION OF ENGLISH TEST.



N = 1911

MEAN = 35·58

σ = 24·31


RAW SCORE DISTRIBUTION OF
ARITHMETIC TEST.
N = 1907
MEAN = 39·45
σ = 18·12
240
220
200
180
160
140
120
100
80
60
40
20
6
18
30
42
54
66
78
90
102
SCORES

A study of these histograms shows that there is a piling up of cases in the Intelligence and English tests towards the lower end. These tests, it appears, do not leave enough space for the children at the lower end of the scale.

(It was found, however, that this piling up of the cases at the lower end could be explained. The distribution of children in classes in India is not on age basis. The promotion from one class to another is based on a standard of achievement fixed by the Department of Education. Each child, no matter how old he is remains in a particular class unless he achieves the standard laid down for that class. The result is that we find children of same age scattered over all classes and also children of different ages in the same class. The children of 11+ thus are found in all classes from Class III to Class X. When the tests were given every child of 11+ was tested irrespective of the class he was in.)

The children of class V and below do not have enough reading ability. It is customary to have all of the examinations in schools up to class IV orally except in arithmetic. Even in class V some of the examinations are held orally. It is only when the children come to class VI that they are given written examination in all subjects. It was thought that the children which had piled up at the lower end in the histograms were probably the children who were in Class V and below because they could not react to the tests satisfactorily owing to the lack of reading ability required by the tests.

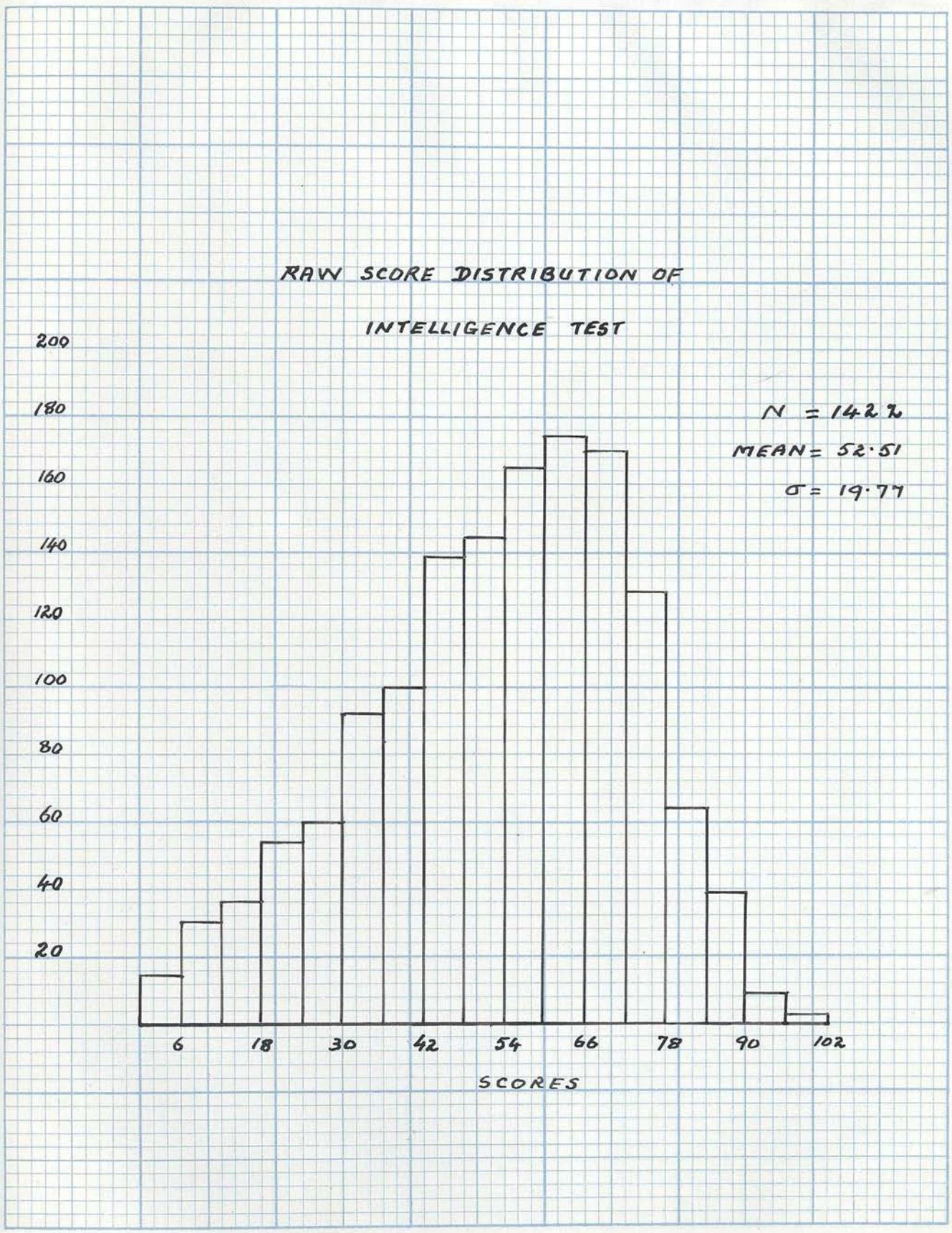
Another fact leant support to this hypothesis. The coefficient of correlation is highest between the Intelligence test and the English test. It was thought that it was the verbal factor common between the two tests to a con-

siderable .....

siderable degree that raised the coefficient of correlation. A look at the three tests would show that there is much more reading to be done in the Intelligence and English tests than in the Arithmetic test. In fact the reading ability required for answering the Arithmetic test is very much smaller than that required for answering the other two tests. The histogram for the Arithmetic test gives a fairly close approximation to the normal curve. This might have been due to the fact that this test does not involve so much reading as do the other two tests.

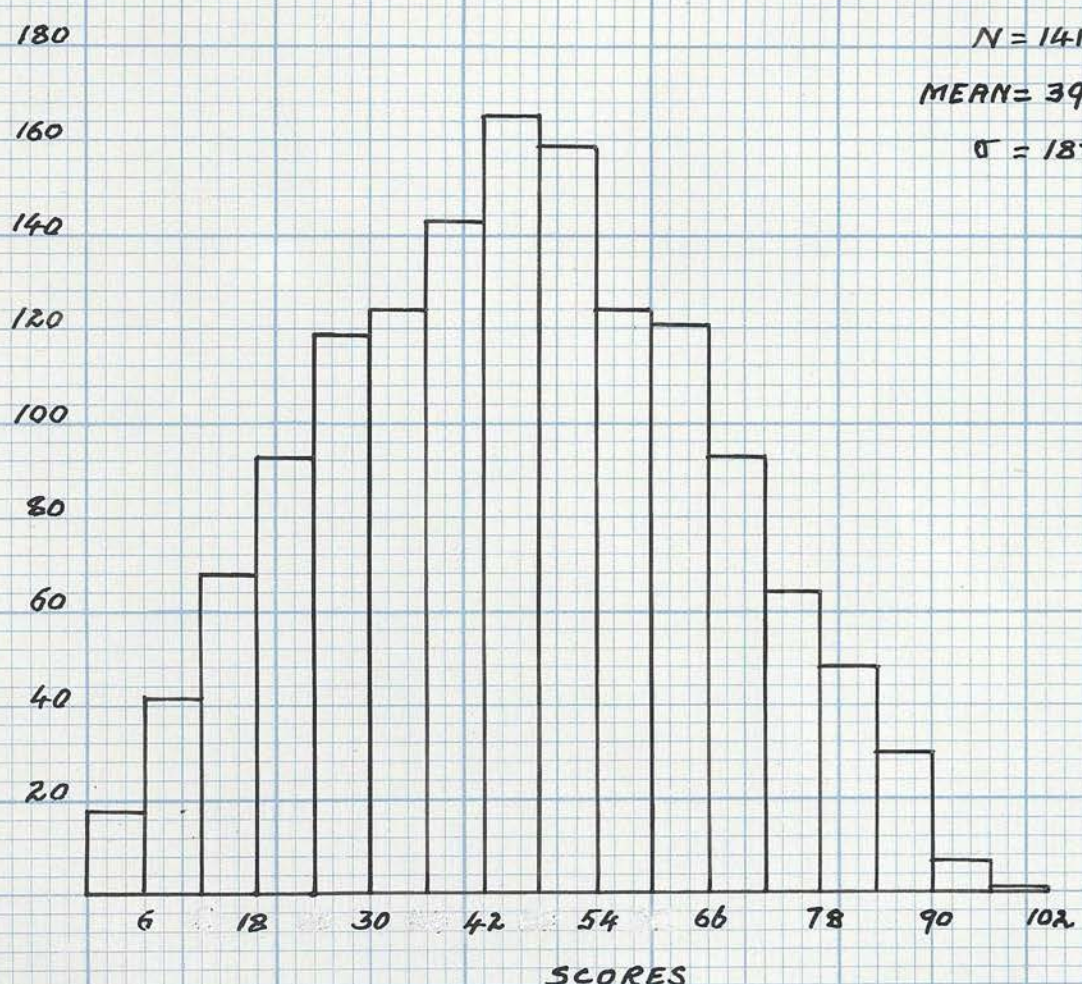
Keeping these facts in mind it was decided to eliminate the children of Class V and below from the sample and then see what shape the histograms of the raw scores of the three tests would assume. On doing this we find that the histograms show a much better approximation to the normal curve.

The histograms of the raw scores of the three tests after the children of class V and below have been eliminated from the sample are given below :-



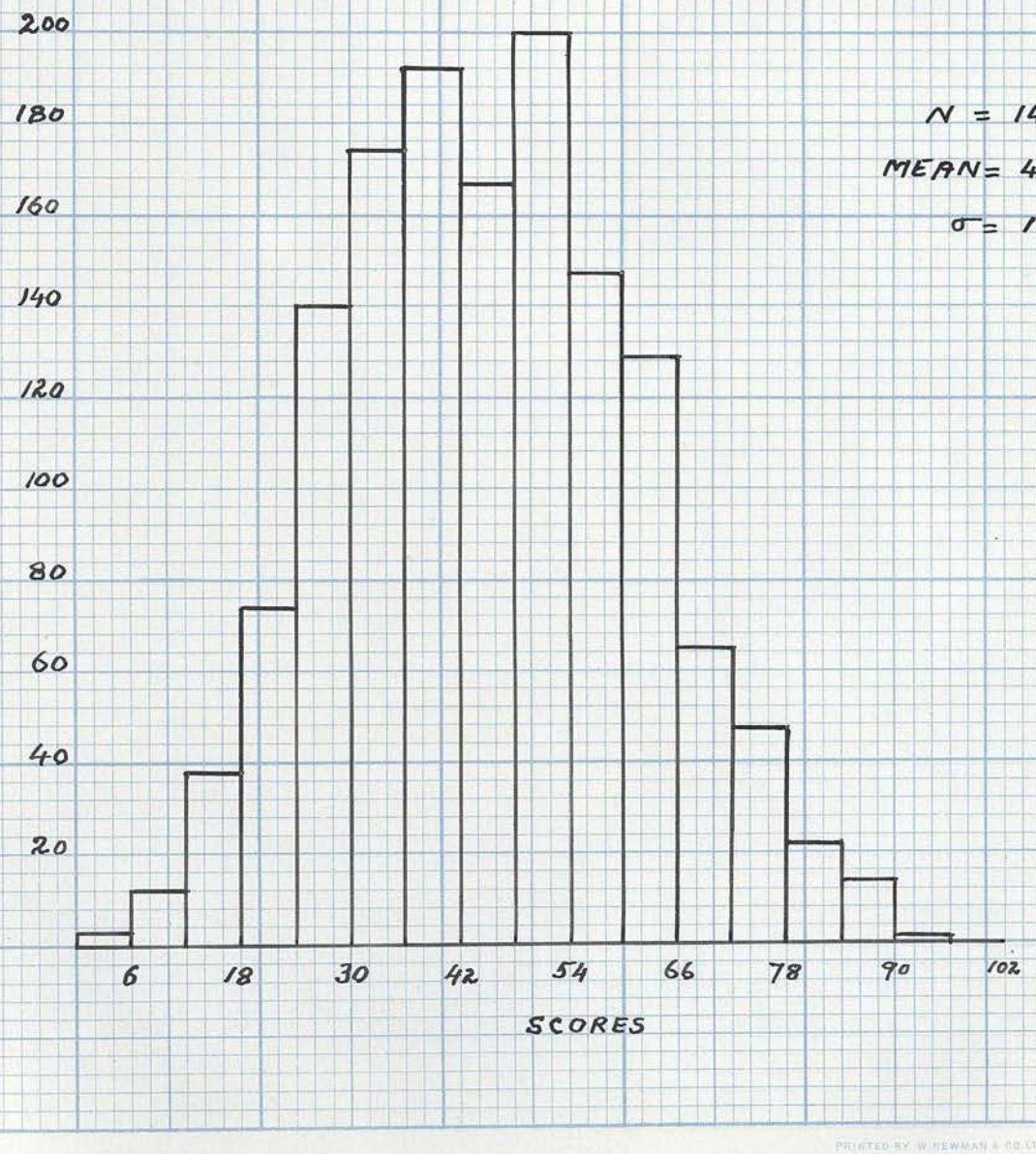
PRINTED BY W. NEWMAN & CO. LTD., CALCUTTA.

RAW SCORE DISTRIBUTION OF
ENGLISH TEST



PRINTED BY W. NEWMAN & CO. LTD., CALCUTTA.

RAW SCORE DISTRIBUTION OF ARITHMETIC TEST



PRINTED BY W. NEWMAN & CO. LTD., CALCUTTA.

After the sample was thus adjusted i.e. after the children in class V and below were left out the number of children who took the test was as follows :-

Test	No.
Intelligence	1422
English	1419
Arithmetic	1425

It is apparent that by altering the sample in this way we are working with a selected sample. But if we take the original sample we feel that in the Intelligence and English tests we are not testing intelligence and comprehension but reading ability of the children in the lower classes. That being so it is not accurate to draw conclusions about the intelligence and comprehension of English of children. By altering the sample we can avoid this objection and safely draw conclusions from the data observed about the two above mentioned abilities. The objection to the altering of the sample is the fact of selection. To meet these difficulties this study has been divided into two parts, Part A, and Part B. Part A deals with the altered sample which from now onwards we will call the "Adjusted Sample" and Part B deals with the original sample which hereinafter we shall call the "Observed Sample". In part B only the figures of results are given and no attempt has been made at discussing results as it is felt that we are not sure whether we are testing there the abilities we want to test. Studies in this part have been carried out merely as a matter of interest. The tests are standardised on the two samples separately and quotients found in each case. Results are obtained for the two samples separately in each part.

PART A.

CHAPTER XIII

THE EQUATIONS OF THE LINES OF BEST FIT.

Intelligence Test.

The equations of the lines of best fit for various percentiles are given below :-

1. 95th percentile, $s = .662a - 9.8$
2. 84th percentile, $s = .663a - 18.6$
3. 50th percentile, $s = .775a - 51.3$
4. 16th percentile, $s = .466a - 31.9$
5. 5th percentile $s = .508a - 53.8$

The slopes of these lines are :-

95th %le	.662
84th %le	.663
50th %le	.775
16th %le	.466
5th %le	.508

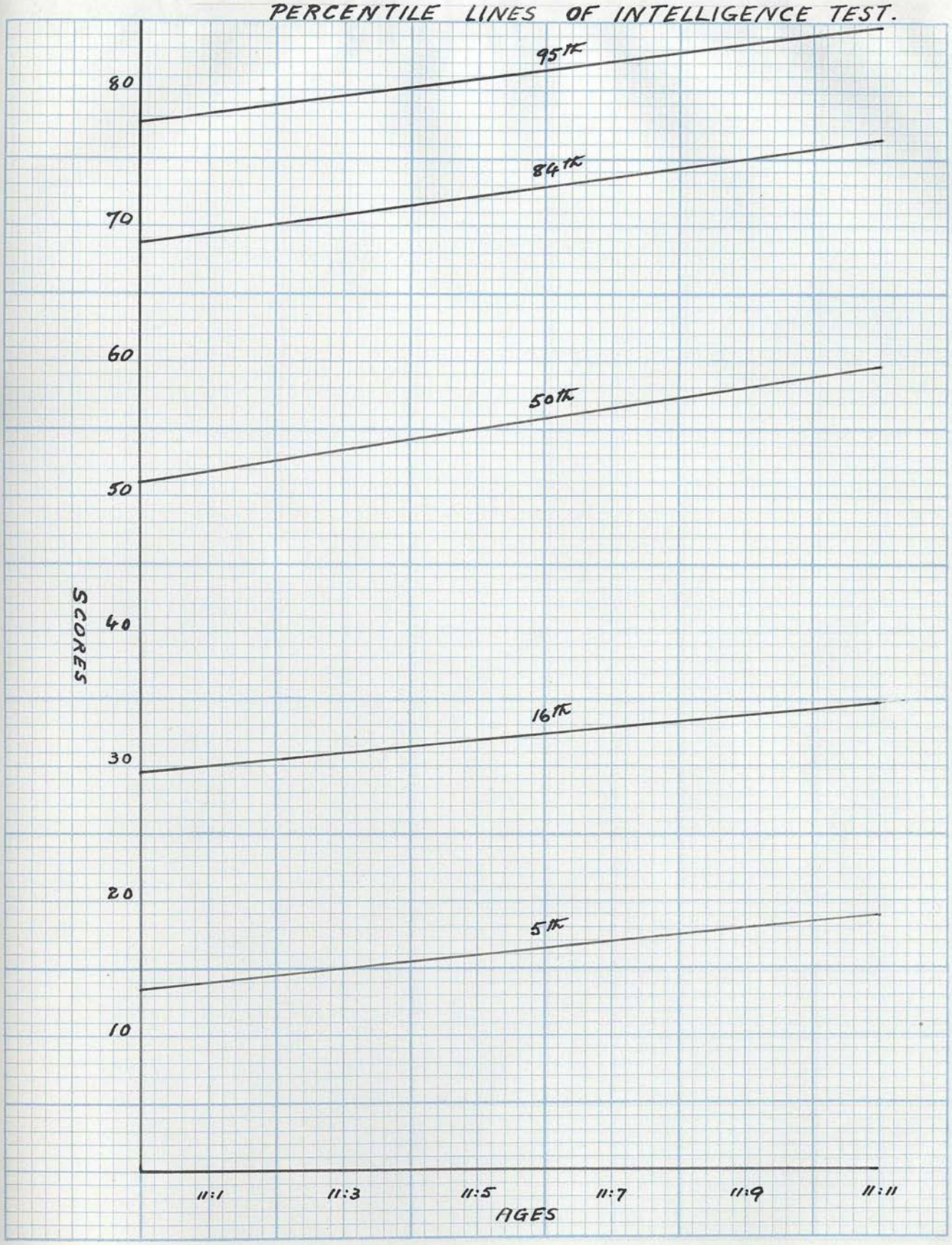
The graph for these lines is given on the next page. The lines of the 95th and 84th percentiles are almost parallel. They show that nearly.7 of a mark for each month of age is given to the children. The line of the 50th percentile allows nearly .8 of a mark for each month of age. The lines of the 16th and the 5th percentiles are again almost parallel and they allow nearly .5 of a point for each month of age.

English Test.

The equations of the lines of best fit for the various percentiles are given below :-

1. 95th %le $s = .763a - 25.9$
2. 84th %le $s = 1.029a - 74.5$
3. 50th %le $s = .760a - 58.7$
4. 16th %le $s = .371a - 26.9$
5. 5th %le $s = .200a - 14.9$

The slopes of these five lines are given ~~below~~ on page 73 :-



PRINTED BY W. NEWMAN & CO. LTD. CALCUTTA

95th %le.	.763
84th %le	1.029
50th %le	.760
16th %le	.371
5th %le	.200

We see from these slopes that the line of 95th %le allows about .8 of a mark for each month of age. The line of 84 %le allows a little more than one mark for each month of age. The line of 50th %le allows nearly .8 of a mark. The other two lines namely the lines of the 16th %le and the 5th %le do not discriminate so well between the different age groups. The line of the 16th %le allows one mark for nearly three months of age and the line of the 5th %le allows one mark for 5 months of age. The test, therefore, does not discriminate very well between children of lower ability.

A graph of the lines is given on the next page.

Arithmetic Test.

The equations of the lines of best fit for the various percentiles are given below :-

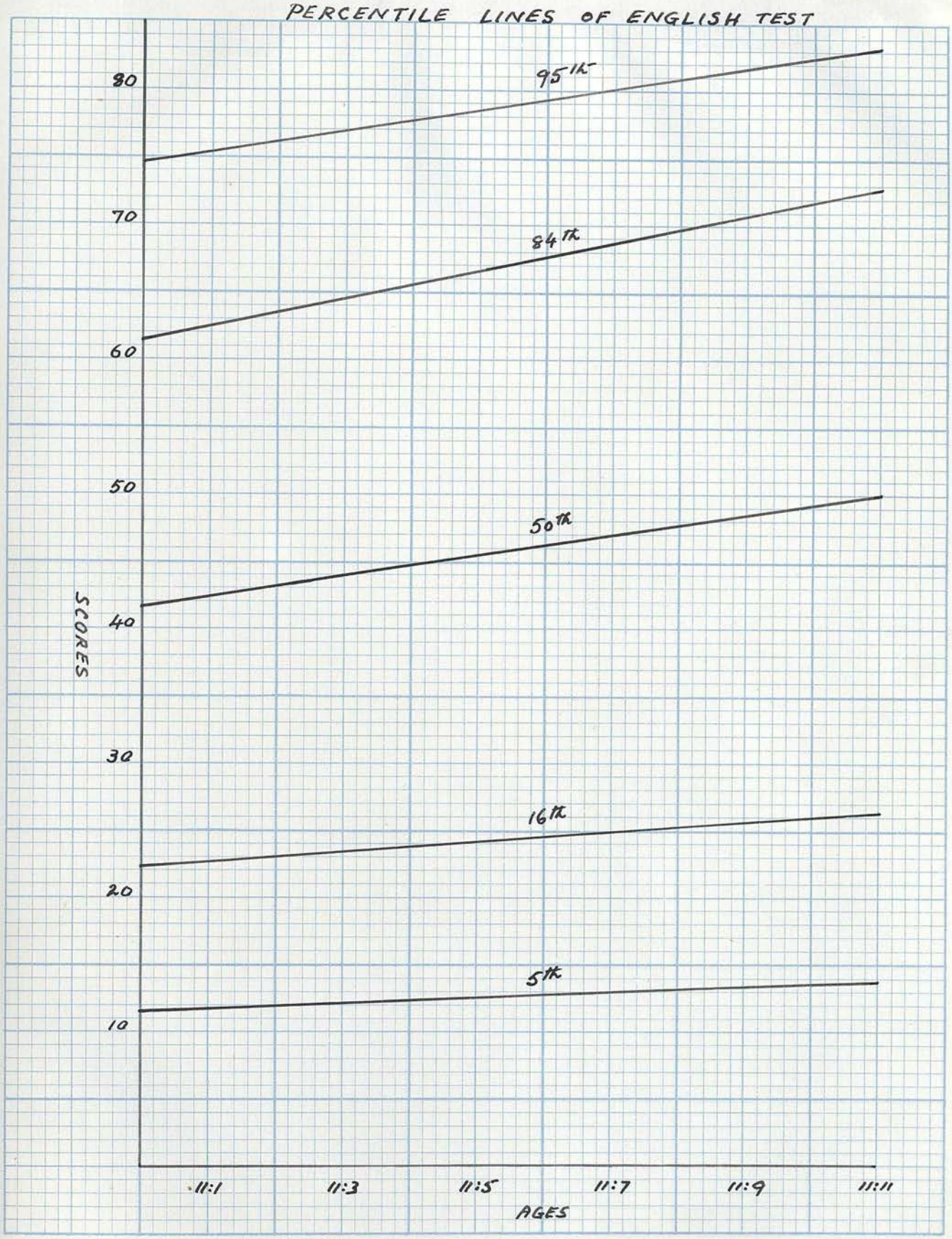
1. 95th %le	s = .829a - 41.1
2. 84th %le	s = .600a - 20.8
3. 50th %le	s = .485a - 21.9
4. 16th %le	s = .367a - 22.4
5. 5th %le	s = .507a - 50.5

The slopes of these lines as noticed from the equations are as given below :-

95th %le	.829
84th %le	.600
50th %le	.485
16th %le	.367
5th %le	.507

We see from these slopes that the line of the 95th

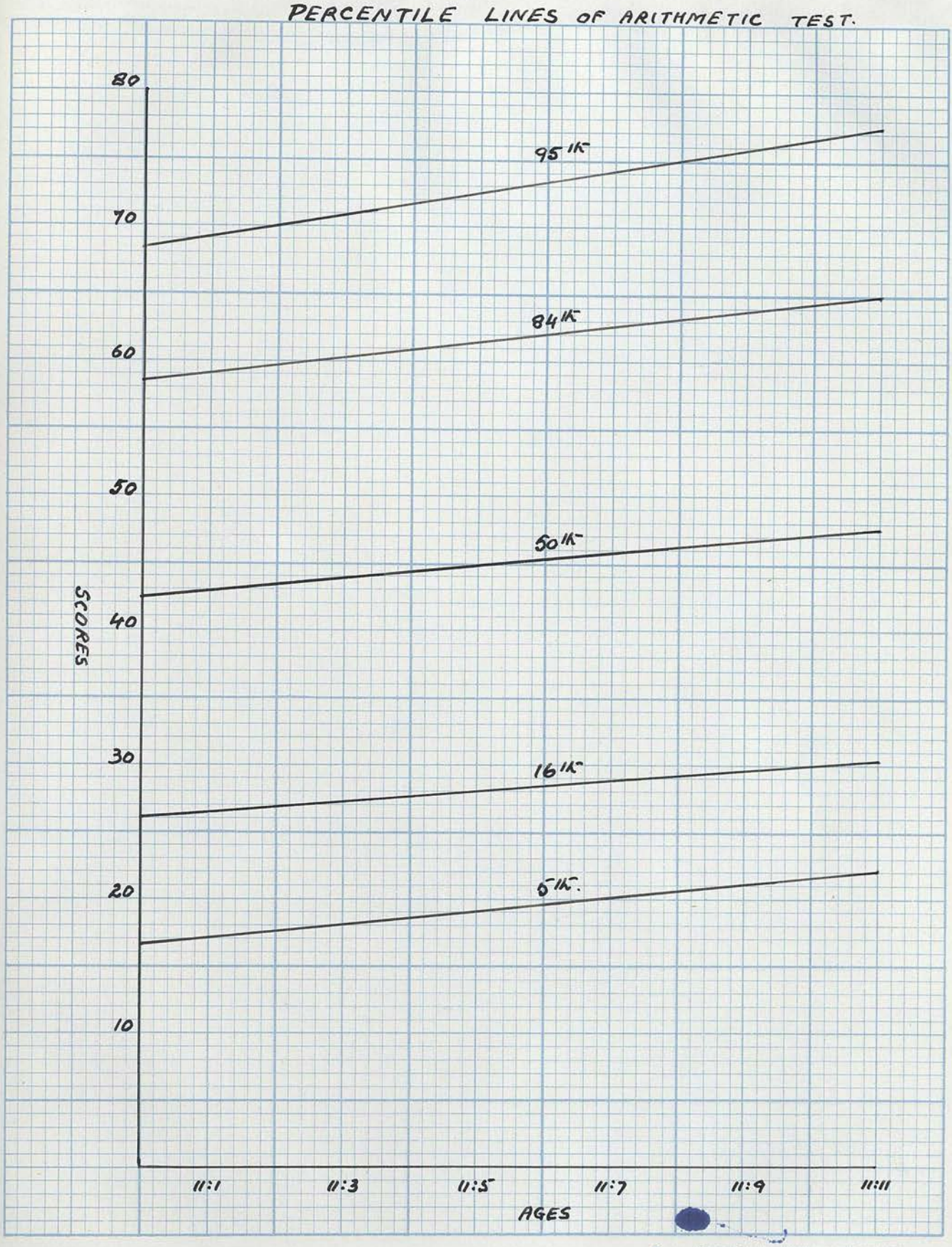
percentile.....



PRINTED BY W. NEWMAN & CO. LTD. CALCUTTA

percentiles allows.8 of a mark for every month of age. The line of the 84th %le allows .6 of a mark, or a little more than half-a-mark for every month of the age. The 50th %le too allows about .5 of a mark for each month of age. The line of 16th %le does not descriminate between different ages so well. It allows only about .4 of a mark ~~of~~ for every month of age. The 5th %le line allows .5 of a mark for every month of age. The graph of these lines is shown on the next page.

PERCENTILE LINES OF ARITHMETIC TEST.



PRINTED BY W. HEWMAN & CO. LTD. CALCUTTA.

CHAPTER XIV

The inter-correlation and reliability of tests.

The inter-correlation of the tests was found from the sample. The following figures give coefficients of correlations together with the probable errors and the number of cases on which the correlation was calculated.-

1. Intelligence and English .67 ± .010 (N=1399) *
2. Intelligence and Arithmetic .59 ± .012 (N=1401)
3. English and Arithmetic .57 ± .012 (N=1415)

Inter-correlations corrected for attenuation.

1. Intelligence and English .73
2. Intelligence and Arithmetic ~~.59~~ .66
3. English and Arithmetic ~~.57~~ .65

RELIABILITY

The reliability of tests was calculated from a random sample in each case by the split-half method. The following are the figures for the coefficients of reliability.:-

1. Intelligence Test .94 (N= 165) **
2. English Test .91 (N= 156)
3. Arithmetic Test .85 (N= 165)

The above figures show that the inter-correlation of tests and their reliability are quite satisfactory.

---

* Scattergrams are given in Appendix XXXI.

** " " " " " XXXII.

CHAPTER XV

Significance of Differences between the Means

In the following chapters we shall be considering very frequently the significance of differences between the various means obtained. It is essential, therefore, to make clear how we decide what differences are statistically significant.

We have taken a D/σ_D of 3 as indicative of significant difference. In doing so we have followed Garrett. He says :-

> "It is customary to take a D/σ_D of 3 as indicative of a significant difference (Virtual certainty) since there is only about 1 chance in 1,000 that a difference of $+3\sigma$ will arise when the true difference is zero".*

Also where chances out of a 100 are shown for the difference being significant these figures are taken from Garrett. *

---

* Garrett - Statistics in Psychology & Education p.213.

CHAPTER XVI

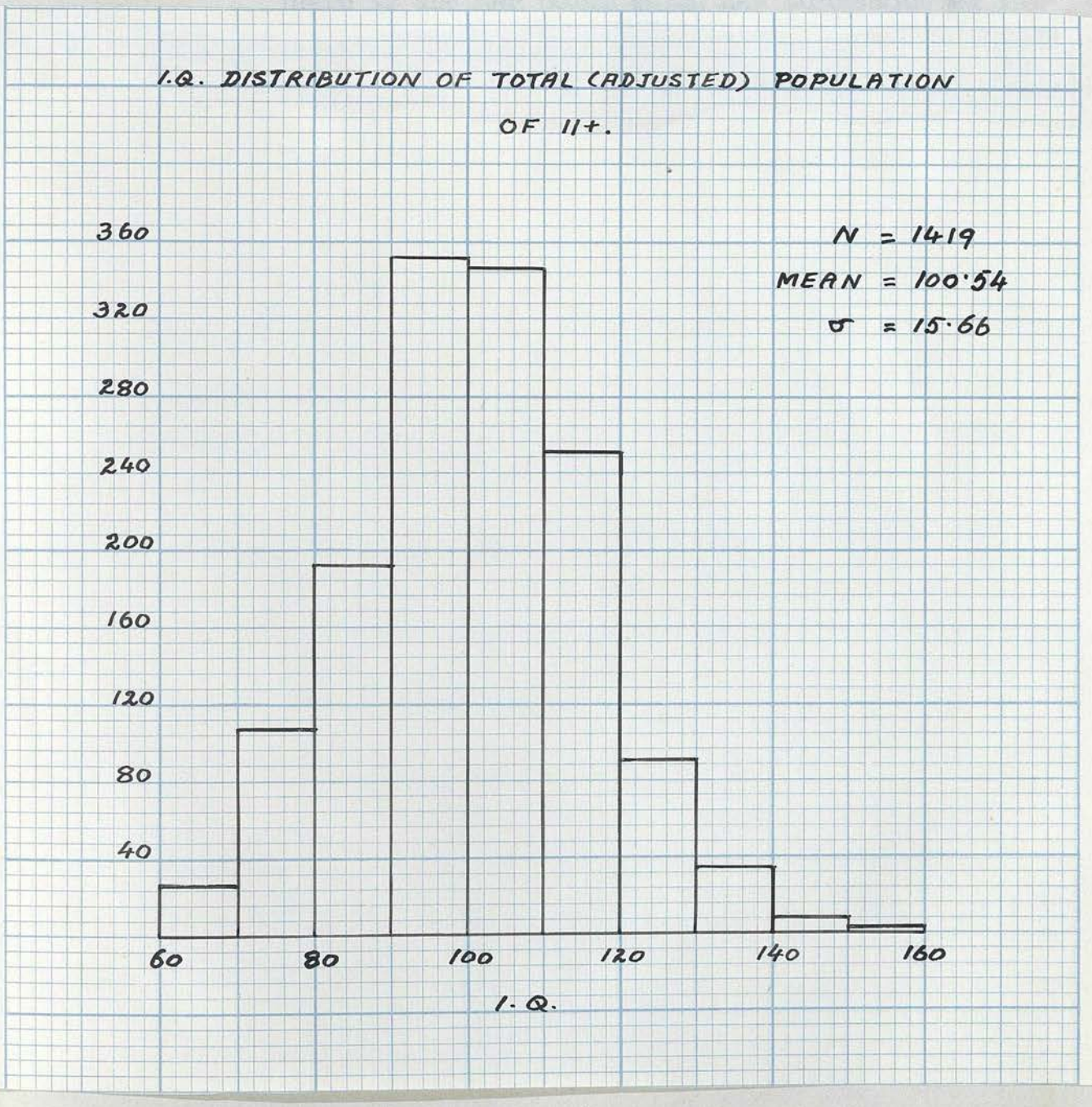
Results of Intelligence testing

The results are studied under the following heads :-

1. Total population.
2. Sexes.
3. Religions.
4. Castes.
5. Geographical regions of the province.
6. Professions of the parents of the children.

Total population.

The mean I.Q. of children of 11+ in classes VI and above is 100.54 (σ_M = .42) with a σ of 15.66.



Sexes.

The following table gives the results obtained for the two sexes :-

TABLE 9.

Sex.	Mean I.Q.	σ	N	σ_M
1. Boys	100.55	15.69	1385	.42
2. Girls	100.09	14.18	34	2.43

These figures show a superiority of .46 or nearly half a point of I.Q. in favour of the boys. D/σ_D is .19. This figure shows that there are nearly 58 chances out of a hundred that this difference is a real one. This is not a very high figure from the point of view the difference being significant.

There is another point which has to be considered in this connection. T here is some conservatism among parents about giving education to girls. An educated girl has better value in the matrimonial market. The same may be said of the boys too.

But inspite of this the education of girls is becoming popular rather slowly and that too in the cities and the towns. The number of girls in this sample is rather small and it is very doubtful if we have a representative sample in their case. Only the families with a little bit of enlightement send their girls to school. Even among these families very often girls are educated at home. Under these circumstances it is doubtful whether the sample obtained from these schools is really a representative one.

We can, therefore, draw no definite conclusion about the intelligence of girls but as judged from the number of cases in this study we can say that there is practically no difference between the intelligence of girls and boys.

A word may be added about the standard deviation of the two sexes. Judging from the results obtained by Burt

it was.....

it was to be expected that the girls are less scattered in Intelligence than the boys. This expectation is borne out by our study. The standard deviations of the boys and girls are 15.69 and 14.18 respectively.

Another fact found by Burt ~~is~~ that girls are slightly superior to boys in verbal tests * is not confirmed by our study.

Religions.

The following table gives comparative figures for the different religions :-

TABLE 10.

Riligions.	Mean I.Q.	σ	N	σ_M
1. Hindus.	100.96	16.09	1084	0.49
2. Mohammadans	99.19	14.04	335	0.77

These figures as they stand show a superiority of 1.77 points of I.Q. in favour of the Hindus. D/σ_D in this case is 1.95. This figure shows that there are nearly 98 chances in a hundred that the difference is a real one. It is not statistically significant.

It is really very difficult to say what really is the popular belief in this matter. It is rather a delicate question to deal with specially when feelings run so high among the two communities on religious and political issues. As would naturally be expected in a case like this the Hindus regard themselves as superior to the Mohammadans and the Mohammadans would in no case be prepared to regard themselves as inferior to Hindus in intelligence. It would be an interesting thing to find out what the government which is supposed to be an impartial body thinks in this matter. Naturally the government cannot be expected to give an open declaration on a point like this. Nor would it be wise for them to do so. But the provision laid down by them for reserving seats for the minority community in

---

* Burt - Mental & Scholastic Tests - P. 193.

an open competetive examination for services appears to be an implicit acknowledgment of the superiority of the majority community.

The standard deviation of the Hindus is bigger than that of the Mohammadans. This fact is borne out by the popular belief. Mohammadans have always been regarded as a more homogeneous community than the Hindus who have many subdivisions and differ from one another to a wider extent than do the Mohammadans.

Castes.

The castes are a feature of Hinduism. The Mohammadans have no castes. There are four major castes among the Hindus. These are the Brahmins, the Kshatriyas, the Vaishas, and the Sudras. We have in our study included another viz the Kayasthas.

The Brahmins are the highest caste. In the old days when the caste system was rigid they were the priest class and as in other countries in old times were in possession of all the learning. Even now the priests are the Brahmins but Brahmins are found in all sorts of professions. So are the other castes. The Brahmins consequently are the highest caste who have been from the earliest times the intellectuals.

The Kshatriyas were the wariors. The Kings and the chiefs in the state were all Khatriyas. They were the rulers and the military class. Although the kings were Kshatriyas they always paid the highest respect to the Brahmins. Like Brahmins now they are in all sorts of professions but quite a large number of them still stick to the army as their profession.

The Vaishas who were the next in importance were the class who occupied themselves with business activities. They were the people who were responsible for the trade of the country.

/Last of.....

Last of all the Sudras, who were the heweres of wood and carriers of water. They were the lowest in order of prestiege.

At the present moment although there are any number of castes the main four divisions are those mentioned above. We have studied another caste viz the Kayasthas. They are people among whom majority of people are literate. Reading and writing and getting into services has been their chief occupation. They hold quite high positions in the liberal professions and the government. Their number is big in the province and it is not certain as to which of the four main divisions of the castes they belong. They have, therefore, been studied separately. They themselves claim to be Kshatriyas and some of them even consider themselves as Brahmins but there are people who would place them even as low as the Sudras.

The following table gives the figures for the comparative I.Q.'s of the Castes :-

TABLE. II.

Caste.	Mean I.Q.	σ	N	σ_M
1. Brahmins	102.00	14.77	284	0.88
2. Kshatriyas	101.07	15.36	166	1.19
3. Vaish	99.37	16.75	187	1.23
4. Sudras	95.44	11.00	32	1.94
5. Kayasthas	101.49	16.98	356	0.90

The table given below gives the D/σ_D of the differences between the means and also the chances out of 100 that the difference is real.

/ TABLE 12 .....

TABEE 12.

	D/σ_D	Chances out of 100
1. Brahmins and Kshatriyas	.63	74
2. Brahmins and Vaish	1.74	96
3. Brahmins and Sudras	3.08	100
4. Brahmins and Kayasthas	.40	67
5. Kshatriyas and Vaishas	.99	84
6. Kshatriyas and Sudras	2.47	99
7. Kshatriyas and Kayasthas	.28	62
8. Vaishas and Sudras	1.71	96
9. Vaishas and Kayasthas	1.39	92
10. Sudras and Kayasthas	2.83	99.74

From the above figures we notice that it is almost certain that the difference between the Mean I.Q's of Brahmins and Sudras is a real difference. The chances of the difference between Kshatriyas and Sudras and Kayasthas and Sudras being real are also very high, being 99 out of a hundred.

As regards the differences between the means of the other castes we can say that we cannot ~~say~~ be sure whether the differences are true or not.

Geographical Regions.

The following table gives the figures for the Geographical Regions of the province :-

TABLE 13.

Region	Mean I.Q.	σ	N	σ_M
1. Northern Hills	101.56	15.54	68	1.88
2. Tarai	98.81	15.36	318	.86
3. Western Plains	100.40	15.38	386	.78
4. Eastern Plains	101.62	16.12	534	.70
5. Southern Uplands	100.87	14.33	113	1.35

The following table gives the chances of the differences between their mean I.Q's being statistically significant.

/TABLE 14.

TABLE 14.

		D/σ_D	Chances in 100
1.	Northern Hills and Tarai	1.33	91
2.	" " " Western Plains	.57	73
3.	" " " Eastern Plains	.03	52
4.	" " " Southern Uplands	.30	62
5.	Tarai and Western Plains	1.37	92
6.	"" " Eastern Plains	2.53	99
7.	" " Southern Uplands	1.29	90
8.	Western Plains and Eastern Plains	1.16	87
9.	Western Plains and Southern Uplands	.30	62
10.	Eastern Plains and Southern Uplands	.49	69

None of the differences is statistically significant. The difference between Tarai and Eastern Plains has a high probability of being the true difference, there being 99 chances out of a 100 that it is true.

Professions.

The professions of the children's parents were classified into the following :-

1. Service
2. Legal Profession.
3. Medical Profession.
4. Business.
5. Zemindars (Land owning people).
6. Cultivators.
7. Teachers.
8. Railway Employees.
9. Skilled workers.
10. Unskilled Workers.
11. Police.
12. Priests.
13. Unemployed.

/Out of these.....

Out of these professions only the first seven have been included in the study. The number of cases in the others was very small and it would not have been justifiable to draw conclusions on such small samples.

A word of explanation might be added for the various professions. "Service" generally includes clerical and minor administrative jobs under the government or other local bodies. It is a very common profession for the moderately educated Indian. The educational policy of the East India Company was to educate Indians so that there may be an adequate supply of moderately literate Indians who could help in the administration of the country. Such men are included under "Service". The next three Legal profession, Medical profession and business need no explanation. Zemindars are the land owning classes, mainly in the villages, who live on the earnings of their lands. They either have the land cultivated for themselves or rent it out for purposes of cultivation. Cultivators are farmers. They till the land and work on it. The other profession need no explanation.

The following table gives the figures for the comparative intelligence of the children of people of different professions :-

TABLE 15.

Profession.	Mean I.Q.	σ	N	σ_M
1. Service	100.96	15.94	728	.59
2. Legal Profession	104.91	15.39	122	1.40
3. Medical Profession	105.86	15.75	44	2.38
4. Business	96.53	14.16	192	1.02
5. Zemindars	99.67	15.50	118	1.43
6. Cultivators	98.97	14.09	38	2.29
7. Teachers	103.91	16.34	61	2.09

The following table gives the chances in 100 of the differences between the mean I.Q's of the various professions

being .....

being statistically significant.

TABLE 16.

	D/σ_D	Chances in 100
1. Service and Legal Profession	2.60	99
2. " " Medical Profession	2.00	98
3. " " Business	3.75	100
4. " " Zemindars	.83	79
5. " " Cultivators	.84	79
6. " " Teachers	1.36	91
7. Legal and Medical professions	.34	64
8. " " Business	4.84	100
9. " " Zemindars	2.62	99
10. " " Cultivators	2.22	99
11. " " Teachers	.40	65
12. Medical and Business	3.60	100
13. " " Zemindars	2.23	99
14. " " Cultivators	2.09	98
15. " " Teachers	.58	73
16. Business and Zemindars	1.78	96
17. " " Cultivators	.97	84
18. " " Teachers	3.17	100
19. Zemindars and Cultivators	.26	60
20. " " Teachers	1.68	96
21. Cultivators and Teachers	1.59	64

We could say, therefore, that the following differences are statistically significant :-

1. Service and Business.
2. Legal Profession and Business.
3. Medical Profession and Business
4. Business and Teachers.

Gifted Children.

The percentage of gifted children, that is those who had an I.Q. 130 or above is 3.24.

/To this.....

To this figure the contribution of the two main religions is as follows :-

1. Hindus	3.17 %
2. Mohammadans	.07 %
Total	3.24 %

The contribution of the various castes in the Hindus to 3.17 (the figure for the Hindus) is as follows :-

1. Brahmins	.85 %
2. Kshatriyas	.28 %
3. Vaishas	.63 %
4. Sudras	.00 %
5. Kayasthas	1.41 %
Total	3.17 %

The Kayasthas contribute the greatest number followed by the Brahmins, Vaishas and Kshatriyas. Although in Mean I.Q. the Brahmins are higher than Kayasthas the Kayasthas have more gifted among them. This is explained by the fact that the standard deviation of the I.Q. of the Kayasthas is bigger than the Brahmins. As will be seen soon that the Kayasthas have more Mentally Defective too among them.

Mentally Defective Children.

The percentage of the mentally defective children that is those who have an I.Q. of 70 or below is 1.62.

To this figure the contribution of the two major religions is as follows :-

1. Hindus	1.20 %
2. Mohammadans	.42 %
Total	1.62 %

The contribution of the various castes among the Hindus to 1.20 (the figure for the Hindus) is as follows :-

1. Brahmins	.211 %
2. Kashatriyas	.141 %
3. Vaishas	.211 %
4. Sudras	.000 %

/5. Kayasthas...

5. Kayasthas	.634 %
Total	1.197 % or 1.20 %

It is interesting to note the figure for the Sudras. If they do not contribute to the figure for the gifted children they do not also contribute to the figure for the mentally defective children. It can be explained by the fact that the standard deviation of the I.Q's of the Sudras is the smallest of all among all the castes.

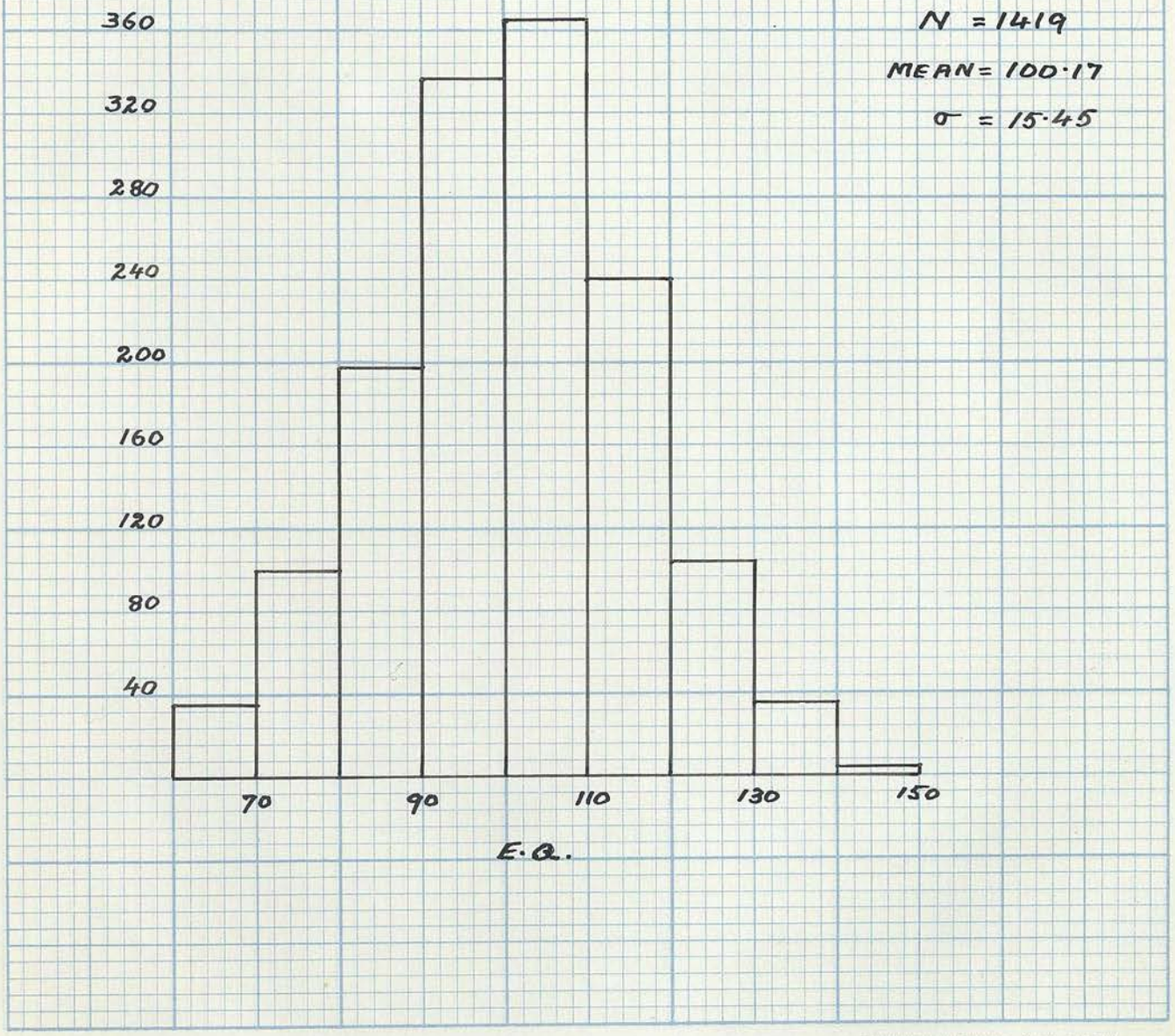
CHAPTER XVII.

Results of English Testing.

The results of English testing were also studied under the same heads as those of Intelligence testing in the previous chapter.

Total Population.

The mean E.Q. (English Quotient) of children of 11+ in classes VI and above is 100.17 (σ_M = 0.41) with a σ of 15.45. The Histogram of the English Quotients of the total population is given below :-



PRINTED BY W. NEWMAN & CO. LTD. CALCUTTA.

Sexes.

The following table gives the results obtained for the two sexes :-

TABLE 17.

Sex.	Mean E.Q.	σ	N	σ_M
1. Boys	100.31	15.38	1385	0.41
2. Girls	94.79	17.23	34	2.96

These figures show a superiority of 5.52 of E.Q. in favour of the boys. D/σ_D is 1.85 giving 96 chances out of a hundred that the difference is real. The difference, therefore, is not statistically significant.

It is rather interesting to note that as observed from the activities of the girls English is not a very popular language with them. Whereas it is very common among men to write to ane another (I am talking of educated men only) in English the girls stick to their own language viz Hindi/or Urdu. The number of girls who take a post-graduate course in English is much smaller than those who offer such a course in Hindi or Urdu. It is hard to decide whether this liking for the mother tongue is responsible for the neglect of English or whether the incapacity for the foreign language promotes a liking for the mother tongue. So far as these figures show it is very likely that the boys have a superiority over the girls in English.

Another point worth noticing is that whereas the standard deviation of the I.Q's of girls is 14.18 the standard deviation of their E.Q's is 17.23 which is bigger than that of the boys. In English ability, therefore, the girls are more scattered than the boys. The boys as a class appear to be superior to the girls but it would not be impossible to find individual girls who are superior to boys. Judging from experience we can say that some girls are very bright in English.

/As pointed.....

As pointed out in the chapter on Intelligence testing we have to remember that it is doubtful if our sample of girls, which is rather small in size, is representative. It should, therefore, be evident that too much faith should not be placed on the likely superiority of boys.

Religions.

The following table gives the comparative figures for the two religions :-

TABLE 18.

Religion.	Mean E.Q.	σ	N	σ_M
1. Hindus	100.31	15.38	1080	.47
2. Mohammadans	99.89	15.72	334	.86

These figures show a superiority of .42 points of E.Q. in favour of the Hindus but D/σ_D is found to be .04 giving about 51 chances out of hundred that the difference is real. This is a very low figure and we can safely conclude that the difference between the religions is not a real one. We cannot really say which of the two communities is superior in English ability. C hances of the one being superior to the other are nearly 50, 50.

It is interesting to note that in intelligence there are 98 chances out of a 100 that the difference of 1.77 points of I.Q. in favour of the Hindus is a real one the Hindus seem to lose that superiority in case of English. Here they show a superiority of only.42 points of E.Q. and this superiority has only 51 chances out of a 100 that it is statistically significant.

As regards the scatter of the English ability of the two communities is concerned we may note that whereas in Intelligence the Mohammadans prove to be much more homogeneous than the Hindus in English they are as scattered as the Hindus, the Standard deviation of the Hindus and the Mohammadans being 15.38 and 15.72.

/Castes.

Castes.

The following table gives the comparative figures for the E.Q. of various castes among the Hindus :-

TABLE 19.

Caste	Mean E.Q.	σ	N	σ_m
1. Brahmins	100.56	14.51	284	.86
2. Kshatriyas	97.36	15.20	168	1.17
3. Vaishas	98.67	13.79	187	1.01
4. Sudras	93.17	12.84	30	2.34
5. Kayasthas	102.65	16.16	356	.86

We shall now investigate whether these differences in the Mean E.Q's are statistically significant. The following table gives the D/σ_D for the differences between the means of the various castes; and the chances out of a hundred that the difference between the means is real :-

TABLE 20.

	D/σ_D	Chances out of 100.
1. Brahmins and Kshatriyas	2.21	98
2. Brahmins and Vaishas	1.42	92
3. Brahmins and Sudras	2.97	100 (99.8)
4. Brahmins and Kayasthas	1.71	96
5. Kshatriyas and Vaishas	.85	80
6. Kshatriyas and Sudras	1.60	94
7. Kshatriyas and Kayasthas	3.65	100
8. Vaishas and Sudras	2.16	98
9. Vaishas and Kayasthas	2.99	100 (99.8)
10. Sudras and Kayasthas	3.81	100

From the figures it is evident that the differences which are statistically significant are these between Kshatriyas and Kayasthas, and Sudras and Kayasthas.

The following ~~three~~ four differences have a high probability of being true differences :-

/1. Brahmins.&.....

1. Brahmins and ~~Kayasthas~~ Kshatriyas
2. Brahmins and Sudras
3. Vaishas and Sudras
4. Vaishas and Kayasthas

Geographical Regions.

The following table gives the comparative figures for the Geographical Regions :-

TABLE 21.

Region.	Mean E.Q.	σ	N	σ_M
1. Northern Hills	99.13	13.86	67	1.69
2. Tarai	97.21	15.54	321	0.87
3. Western Plains	99.28	15.55	534	0.67
4. Eastern Plains	102.56	15.19	387	0.77
5. Southern Uplands	102.05	13.89	110	1.32

The following table gives the chances of the differences in their means being statistically significant :-

TABLE 22.

	D/σ_D	Chances out of 100
1. Northern Hills and Tarai	1.01	84
2. Northern Hills and Western Plains	0.08	54
3. Northern Hills and Eastern Plains	1.84	96
4. Northern Hills and Southern Uplands	1.36	91
5. Tarai and Western Plains	1.88	97
6. Tarai and Eastern Plains	4.78	100
7. Tarai and Southern Uplands	3.06	100
8. Western Plains and Eastern Plains	3.22	100
9. Western Plains and Southern Uplands	1.87	97
10. Eastern Plains and Southern Uplands	.34	64

From the above table it is evident that the differences which are statistically significant are the following :-

1. Tarai and Eastern Plains
2. Tarai and Southern Uplands
3. Western Plains and Eastern Plains

/We can say,.....

We can say, therefore, that the Eastern Plains are superior to the Western Plains and Tarai and that Southern Uplands are superior to Tarai.

Professions.

The following table gives figures for the comparative English Quotients according to the Professions of the parents :-

TABLE 23.

Profession.	Mean E.Q.	σ	N	σ_M
1. Service	100.83	15.04	708	0.57
2. Legal Profession	106.05	14.59	116	1.35
3. Medical Profession	103.83	15.97	45	2.42
4. Business	95.06	14.26	197	1.02
5. Zemindars	97.56	15.36	108	1.48
6. Cultivators	96.85	14.15	34	2.42
7. Teachers	101.82	16.53	56	2.21

The following table gives the chances out of a 100 of the differences of the means of various professions being statistically significant :-

TABLE 24.

	D/σ_D	Chances out of 100
1. Service and Legal	4.46	100
2. Service and Medical	1.21	88
3. Service and Business	4.93	100
4. Service and Zemindars	2.07	98
5. Service and Cultivators	1.60	94
6. Service and Teachers	.43	66
7. Legal and Medical	.80	79
8. Legal and Business	6.50	100
9. Legal and Zemindars	4.18	100
10. Legal and Cultivators	3.32	100
11. Legal and Teachers	1.63	94
12. Medical and Business	3.33	100
13. Medical and Zemindars	2.21	99 (98.6)

14. Medical.....

14.	Medical and Cultivators	2.04	98
15.	Medical and Teachers	.61	73
16.	Business and Zemindars	1.39	92
17.	Business and Cultivators	.68	75
18.	Business and Teachers	2.78	100 (99.7)
19.	Zemindars and Cultivators	.25	60
20.	Zemindars and Teachers	1.64	94
21.	Cultivators and Teachers	1.52	93

Looking at the above table we can conclude that the following differences are statistically significant :-

1. Service and Legal Profession.
2. Service and Business
3. Legal and Business
4. Legal and Zemindar
5. Legal and Cultivators.
6. Medical and Business

We can conclude, therefore, that the children whose parents are in legal profession are superior to children whose parents are in Service, business, zemindari or cultivation. Further children whose parents are in business are also inferior to those whose parents are in service, and Medical profession.

In the case of the following pairs the probability of the differences being significant as quite high :-

1. Service & Zemindars
2. Medical & Zemindars
3. Medical & Cultivators
4. Business & Teachers.

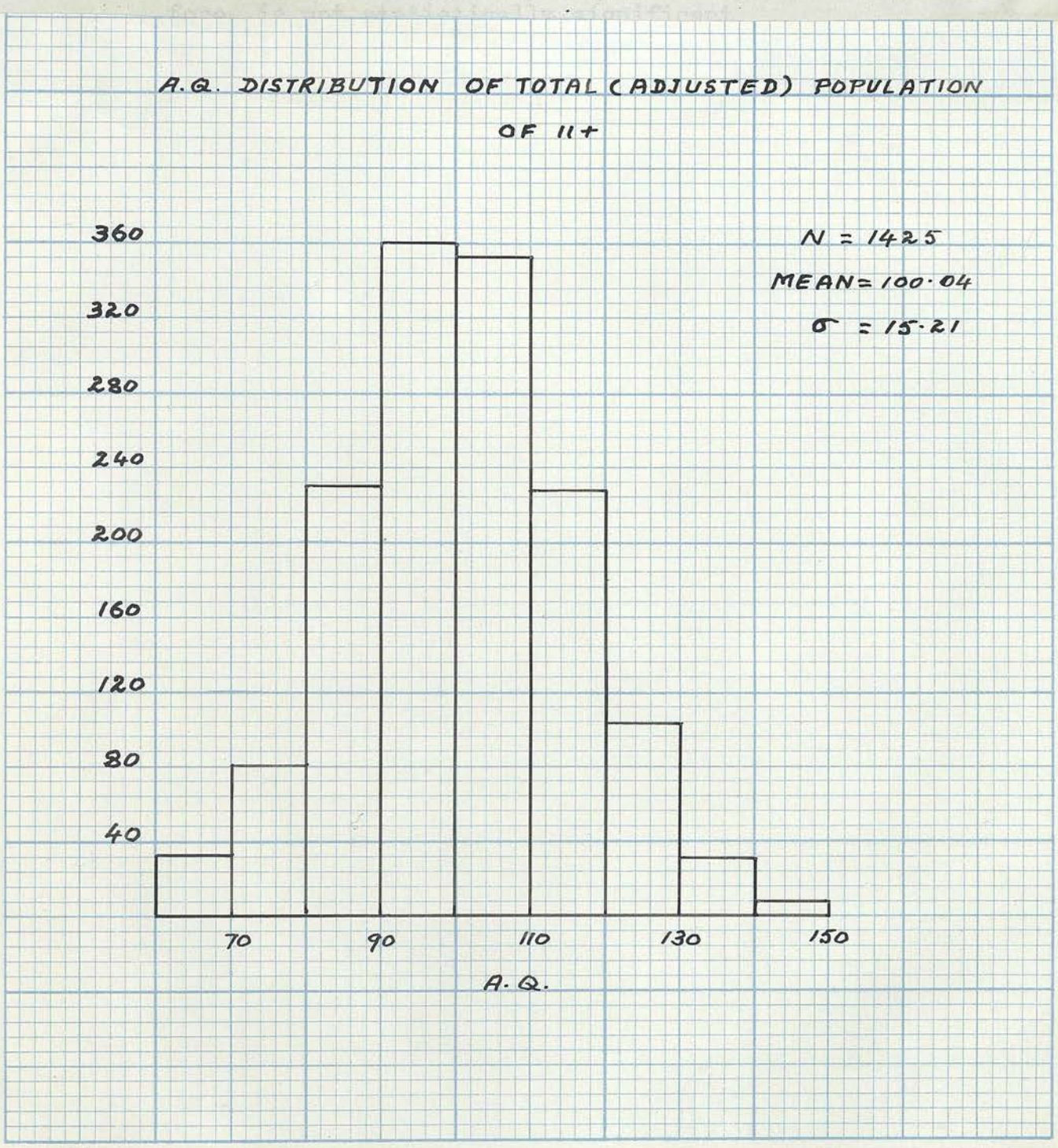
CHAPTER XVIII.

Results of Arithmetic Testing.

The results of Arithmetic testing are also studied under the same heads as those of Intelligence and English.

Total Population.

The Mean A.Q. (Arithmetic Quotient) of children of 11+ in classes VI and above is 100.04 (σ_M = 0.40) with a σ of 15.21. The Histogram of the Arithmetic Quotients of the Total Population is given below :-



PRINTED BY W. NEWMAN & CO. LTD. CALCUTTA.

Sexes.

The following table gives the figures for the comparative Arithmetic ability of the two sexes :-

TABLE 25.

Sex.	Mean A.Q.	σ	N	σ_M
1. Boys	100.14	15.23	1392	0.41
2. Girls	96.02	12.73	33	2.39

These figures show a superiority of 4.12 of A.Q. in favour of the boys. D/σ_D is 1.70 giving 96 chances out of a 100 that the difference is real. The difference, therefore, is not statistically significant.

It is interesting to note that whereas the standard deviation of English Quotients of the girls is bigger than that of the boys in the case of Arithmetic Quotients it is smaller. The standard deviation for boys and girls being 15.23 and 12.73 respectively. The standard deviation of the girls in the case of Intelligence was 14.18. It is cleare, therefore, that the girls cluster round the mean much more closely in the case of Arithmetic ability than in the case of Intelligence or English.

Once more we may remember that there is a danger of the sample of the girls being not representative.

Religions.

The following table gives the comparative figures for the two religions :-

Religion.	Mean A.Q.	σ	N	σ_M
1. Hindus	100.56	15.08	1084	.46
2. Mohammadans	98.61	15.44	336	.84

These figures show a superiority of 1.95 points of A.Q. in favour of the Hindus. D/σ_D is 2.03 giving 98 chances out of a 100 that the difference is real. We cannot be absolutely certain, therefore, that the Hindus are superior to the Mohammadans in Arithmetic. The probability for this difference being real is high.

/It is .....

It is interesting to note that the standard deviation of the two communities in case of Arithmetic is almost the same. In the case of Intelligence the Mohammadans are a much more homogeneous lot than the Hindus. Their Standard deviation is smaller than the Hindus but in English and Arithmetic ability the scatter among the Mohammadans is approximately the same as among the Hindus.

Castes.

The following table gives the comparative figures for the various castes among the Hindus :-

TABLE 27.

1 Caste	Mean A.Q.	σ	N	σ_M
1. Brahmins	99.92	14.85	286	0.88
2. Kshatriyas	100.52	14.52	171	1.11
3. Vaishas	102.57	14.83	187	1.08
4. Sudras	97.95	13.71	29	2.54
5. Kayasthas	100.76	15.23	253	0.81

The following table gives the chances out of a 100 for the differences between the mean A.Q's of the various castes being statistically significant :-

TABLE 28.

	D/σ_D	Chances out of 100
1. Brahmins and Kshatriyas	.42	65
2. Brahmins and Vaishas	1.91	97
3. Brahmins and Sudras	.73	76
4. Brahmins and Kayasthas	.70	76
5. Kshatriyas and Vaishas	1.32	90
6. Kshatriyas and Sudras	.93	82
7. Kshatriyas and Kayasthas	.18	57
8. Vaishas and Sudras	1.67	95
9. Vaishas and Kayasthas	1.34	90
10. Sudras and Kayasthas	1.05	85

Judging from the above figures we can say there are no differences which are statistically significant.

/Geographical Regions...

Geographical Regions.

The following table gives the figures for the comparative ability in Arithmetic of the various Geographical Regions of the Province :-

TABLE 29.

Region	Mean A.Q.	σ	N	σ_M
1. Northern Hills	99.79	12.77	68	1.55
2. Tarai	99.14	13.87	319	0.78
3. Western Plains	99.57	14.90	540	0.68
4. Eastern Plains	101.72	15.87	385	0.81
5. Southern Uplands	99.09	14.87	109	1.42

We would study now as to which of these differences are statistically significant. The following table gives D/σ_D and the chances out of 100 for each one of the differences of being statistically significant.

TABLE 30.

	D/σ_D	Chances out of 100
1. Northern Hills and Tarai	.38	65
2. Northern Hills and Western Plains	.13	56
3. Northern Hills and Eastern Plains	1.10	86
4. Northern Hills and Southern Uplands	.33	63
5. Tarai and Western Plains	.42	65
6. Tarai and Eastern Plains	2.30	99(98.9)
7. Tarai and Southern Uplands	.03	50
8. Western Plains and Eastern Plains	2.03	98
9. Western Plains and Southern Uplands	.31	62
10. Eastern Plains and Southern Uplands	61	94

From these figures it is evident that none of the differences is really significant. We cannot be absolutely sure that there is any difference in arithmetic ability between the children of various geographical regions of U.P. Two of the differences, however are worth noticing. In their case the probability for the difference being real or significant is pretty high. These are, firstly difference between Tarai and Eastern Plains giving 99 chances out of a 100 that the children of Eastern Plains are superior in arithmetic ability to those children living in the Tarai and secondly.....

and secondly the difference between Western Plains and Eastern Plains giving 98 chances out of a 100 that the difference is significant.

Professions.

The following table gives the figures for the comparative Arithmetic ability of children classified according to the profession of their parents :-

TABLE 31.

PROFESSION	Mean A.Q.	σ	N	σ_M
1. Service	99.90	15.15	708	0.57
2. Legal Profession	103.51	14.34	121	1.30
3. Medical Profession	98.97	14.63	38	2.38
4. Businessmen	100.09	14.76	202	1.04
5. Zemindars	99.42	15.59	122	1.41
6. Cultivators	104.50	13.74	36	2.29
7. Teachers	99.75	17.61	61	2.25

We shall now study whether the differences are statistically significant. The following table gives the chances out of 100 for the differences being statistically significant.

TABLE 32.

Profession	D/σ_D	Chances out of 100
1. Service and Legal	2.54	99
2. Service and Medical	0.38	65
3. Service and Business	0.16	56
4. Service and Zemindars	0.32	62
5. Service and Cultivaters	1.95	98
6. Service and Teachers	0.06	52
7. Legal and Medical	1.68	95
8. Legal and Business	2.06	98
9. Legal and Zemindars	2.13	98
10. Legal and Cultivators	0.38	65
11. Legal and Teachers	1.45	93
12. Medical and Businessm	0.43	66

13. Medical and.....

13.	Medical and Zemindars	0.16	56
14.	Medical and Cultivators	1.68	95
15.	Medical and Teachers	0.24	60
16.	Business and Zemindars	0.38	65
17.	Business and Cultivators	1.75	96
18.	Business and Teachers	0.14	55
19.	Zemindars and Cultivators	1.89	96
20.	Zemindars and Teachers	0.12	54
21.	Cultivators and Teachers	1.48	93

The above figures show that none of the differences are statistically significant. Four figures, however, are worth noticing. There are 99 chances out of a 100 that the difference between Service and Legal Profession is a real one and there are 98 chances out of a hundred for the difference being real between Service and Cultivators, Legal and Business and Legal and Zemindars.

CHAPTER XIX

The Educational Survey.

We have studied so far the distribution of intelligence, English ability, and Arithmetic ability among the sexes, religions, castes, geographical regions and professions. The interest in this study was purely scientific. The results are, from the point of view of the educational administrator, of a purely theoretical nature. In this chapter we give results obtained from this study which will be of use to the administrative officers of the Education Department. We shall study the work done in the different Circles of the Inspectors and the different Government High Schools. To explain how this particular part of the study was carried out I shall like to quote in detail from Alexander. *

> "".....I propose, therefore, to give in some detail the procedure for carrying out a mental survey."
>
> " Carefully standardised attainment tests and aptitude tests are administered to all the children in a particular age group in an area. The results thus obtained give the following information for every child : Arithmetic Quotient; English Quotient; Verbal Quotient.** The correct educational result is for these three values to be the same. This information taken in the areas as a whole is of the greatest possible value in terms, not only of individual pupils but of individual schools, because for each school it is possible to obtain a mean VQ, a mean Arithmetic Quotient and a mean English Quotient. Just as these three figures should be very close together for each individual pupil, so they should be in the case of each school. If, for example, the

---

* Alexander-" The Educational Needs of Democracy ".

** We have called VQ, IQ.

mean VQ for any particular school is 100, indicating that the pupils are, on the whole, of average capacity, then the Arithmetic Quotient should also be 100 and so should the English Quotient. Judgment must not be passed on the work of any school unless the capacity of its pupils is taken into account. The expectation that the standard of work in all schools will be the same makes the assumption that all schools have children of the same average capacity; since it is a well-known fact that schools in different areas, and even in different parts of the same area, have children of widely differing capacities, it is inevitable that differences in the standards of work of different schools will occur, and, indeed, should occur if the education of the children in each of the schools is to be in accordance with their capacity."

" It may be found that for a particular school the mean Arithmetic Quotient is higher than would be expected, i.e. higher than the mean VQ, whereas the English Quotient is lower than the mean VQ. This is a matter for investigation by the head of the school. It may be that the balance of the time table is wrong, that too much attention is being devoted to Arithmetic and too little to English. It may be a problem in staffing, that the teacher in charge of the age group is better at teaching Arithmetic than English. What ever the reason may be, some adjustment must be made, because while there is no suggestion that the value of the work of the junior school can be judged solely in terms of minimum essentials in English and Arithmetic, it is and must always be true that an essential part of the work of the junior school is to ensure that the children are taught these two subjects in accordance with their capacity. Results

taken for an area as a whole will indicate this relationship between the average attainment of the pupils in different schools and their average capacity, and will therefore enable a reasonable judgment to be made on the work of the schools as a whole."

" In addition to these three values, the following figures may also be obtained from the survey results:"

" Mean Achievement Ratio in Arithmetic.---This is obtained by dividing the Mean Arithmetic Quotient by the Mean VQ, and it should approximate to 100 if the attainment in Arithmetic is in close relationship to the capacity of the children."

" Mean Achievement Ratio in English.--- This is obtained by dividing the Mean English Quotient by the Mean VQ."

" Mean Achievement Ration for both Subjects.-- This is obtained by taking the mean of the Arithmetic Quotient and the English Quotient, which may properly be called the Attainment Quotient, and dividing by the mean V.Q."

" Relative Ratio.-- This is the relationship between the English Ratio and the Arithmetic Ratio. If a proper balance between these two subjects is being maintained, this value should also approximate to 100."

The above quotation gives in detail the procedure that we have followed in this study. We have found the I.Q, the English Quotient, the Arithmetic Quotient, and the Education Quotient for each individual pupil. In the above quotation Alexander has not talked of the Education Quotient. This is obtained by taking the mean of the Arithmetic and English Quotients. We might quote Burt about the finding

of the Education Quotient. He prefers to call it the Educational Ratio :-

> " Thus, a given individual's performances in a series of scholatic tests may each of them be expressed in terms of a mental age-- an age for reading, an age for spelling, an age for arithmetic, and so forth. The average of the mental ages obtained for the separate subjects may be termed the child's educational age. As before, however, we must take into account the chronological age of the particular pupil. If we divide his educational age by his choronological age, and express the fractions as a percentage, we arrive at a figure which, I have suggested, may be conveniently called the child's educational ratio."*

It will be noted that this method of calculating the Education Quotient and that mentioned by us, namely by taking the mean of the quotient in the two subjects (because the children have been tested in only two subjects) are identical. We have also calculated the Mean Achievement Ratio in Arithmetic, the Mean Achievement Ratio in English, the Mean Achievement Ratio for both Subjects and the Relative Ratio for each school, for each Circle of the Inspectors and for the whole province. Achievement Ratios are the best in telling whether the child is working to the full limit of his capacity in each subject or in both the subjects combined. If the child is doing so this figure should be 100. We might quote Burt again on this point .-

> "If a child's achievement ratio is exactly 100, then teaching is keeping pace with mental growth; the child, it may be inferred, is learning his lessons up to the full limit of his inborn capacity".*

We shall now give these figures.

The Intelligent Quotient, English Quotient and the Arithmetic Quotient of each individual pupil are given in

---

* Burt - "The Backward Child".

the Tabulation.....

in the Tabulation Register (Appendix XXXX).

The following are the figures for the province as a whole :-

1. Mean Intelligent Quotient	100.54
2. Mean English Quotient	100.17
3. Mean Arithmetic Quotient	100.14
4. Mean Education Quotient	100.16
5. Mean Achievement Ratio English	99.63
6. Mean Achievement Ratio Arithmetic	99.60
7. Mean Achievement Ratio Both Subjects	99.62
8. Relative Ratio	99.97

All these figures are approximately 100. We can, therefore, draw the conclusion that in the province as a whole the children are of average ability and are doing satisfactory work in English, Arithmetic and both subjects combined. There is a balance between the teaching of English and Arithmetic and one subject is not emphasised at the cost of the other. In other words the Government High Schools of the province are doing satisfactory work.

The table on the next page gives the figures for the different Circles under the Inspectors :-

INFORMATION ABOUT INSPECTORATES (BOYS SCHOOLS)

Circle No.	NAME OF CIRCLE	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Ed.& Q.	Mean A.R.E.	Mean A.R.A.	Mean A.R.Ed.	Relation Ratio.	Remarks
I.	Meerut	98.69	95.28	89.36	97.16	96.54	99.67	98.45	103.23	
II.	Agra	100.84	98.98	98.78	99.63	98.16	97.96	98.80	99.80	
III.	Bareilly	100.01	100.83	100.88	100.89	100.72	100.87	100.88	100.05	
IV.	Allahabad	101.84	103.23	100.22	102.02	101.36	98.41	100.18	97.08	
V.	Benares	102.03	103.65	103.30	103.86	101.59	101.24	101.28	99.66	
VI.	Lucknow	102.55	102.34	102.49	102.72	99.80	99.94	100.17	100.15	
VII.	Fyzabad	97.72	97.88	98.15	98.67	100.16	100.44	100.97	100.28	

N.B. - In the above and other tables of a similar nature in this study the following abbreviations have been used :-

I.Q. = Intelligence Quotient
E.Q. = English Quotient
A.Q. = Arithmetic Quotient
Ed.Q. = Education Quotient
A.R.E. = Achievement Ratio English
A.R.A. = Achievement Ratio Arithmetic
A.R.Ed. = Achievement Ratio Education.

While studying this table we notice that quite a number of figures deviate from hundred. The question arises what limits for these figures must be assigned to judge a satisfactory state of affairs. Theoretically 100 is the ideal figure but for practical working we must allow certain amount of deviation from this figure. Once again we shall follow Alexander. He says "It has been our usual practice to presume that a value between 95 and 105 may be taken to indicate a satisfactory state of affairs either in Arithmetic or English or in Relative Ratios."* Following this rule we can conclude that satisfactory work is being done in all the Circles under different Inspectors. The children are working up to the limit of their inborn capacity in English and Arithmetic and in the two subjects combined. A proper balance is maintained in the teaching of the two subjects. It appears from the figures that although on the whole the Circles are doing satisfactory work the III Circle (Bareilly) is doing the most balanced work. The children are of average capacity and are doing work which is very well commensurate with their inborn capacity.

The table on the next page gives the figures for the different Government High Schools in the province :-

---

* Alexander - Educational Needs of a Democracy.

B O Y S S C H O O L

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R.B.	Relative Rates.	Remarks
1.	Saharanpur	104.34	102.00	102.10	102.45	97.76	97.85	98.19	100.10	
2.	Roorkee	101.47	99.18	103.83	102.29	97.74	102.33	100.81	104.69	
3.	Meerut	100.40	95.18	95.24	95.93	94.80	94.86	95.55	100.06	
4.	Hapur	93.92	92.17	104.33	98.42	98.14	111.08	104.79	113.19	✓
5.	Bulandshahr	93.96	93.77	89.88	92.12	99.80	95.66	98.04	95.85	
6.	Bijnor	100.58	96.91	103.18	100.27	96.35	102.59	99.69	106.47	✓
7.	Najibabad	91.53	78.43	96.40	87.80	85.69	105.32	95.92	122.91	✓
8.	Srinagar (Garhwal)	90.15	87.82	96.38	92.62	97.42	106.91	102.74	109.75	✓
9.	Lansdown	101.09	98.77	96.87	98.18	97.71	95.83	97.12	98.08	
10.	Aligarh	96.61	95.34	91.82	93.84	98.69	95.04	97.13	96.31	
11.	Hathras	92.56	99.13	95.88	98.40	104.83	103.59	106.31	96.72	
12.	Muttra	109.36	109.86	104.21	107.21	100.46	95.29	98.03	94.86	
13.	Agra	100.95	96.40	98.00	97.45	95.49	97.08	96.53	101.66	
14.	Mainpuri	101.13	98.13	99.50	99.06	97.03	98.39	97.95	101.40	
15.	Etah	99.68	98.20	95.76	100.92	98.52	96.07	101.24	97.52	
16.	Farukhabad	93.78	96.11	102.11	99.32	102.48	108.88	105.91	106.24	

17. Fatehgarh.....

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R.B.	Relative Rates.	Remarks.
17.	Fatehgarh	107.11	105.36	104.11	105.31	98.37	97.20.	98.32	98.81	
18.	Etawah	106.21	95.94	102.72	99.50	90.33	96.71	93.68	107.07	ℓ
19.	Bareilly	100.00	102.60	97.29	100.20	102.60	97.29	100.20	94.83	
20.	Budaun	95.80	104.31	99.17	101.77	108.88	103.52	106.23	95.07	
21.	Muradabad	102.25	101.14	103.62	102.89	98.91	101.34	100.63	102.45	
22.	Amroha	93.36	97.41	103.33	100.38	104.34	110.68	107.52	106.08	ℓ
23.	Shahjahanpur	108.87	99.93	97.15	99.08	91.79	89.24	91.01	97.22	ℓ
24.	Pilibhit	98.90	94.34	100.29	97.56	95.39	101.40	98.65	106.31	ℓ
25.	Naini Tal	104.57	105.61	102.27	102.35	100.99	97.80	97.88	96.84	
26.	Almora	106.00	106.00	113.00	109.71	100.00	106.60	103.50	106.60	
27.	Cawnpore	99.93	98.17	96.45	97.62	98.24	96.52	97.69	98.25	
28.	Fatehpur	99.20	106.33	106.93	107.00	107.19	107.79	107.86	100.57	
29.	Allahabad	103.47	108.37	101.12	105.00	104.74	97.73	101.48	93.31	ℓ

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R.B.	Relative Rates.	Remarks
30.	Jhansi	106.32	108.03	102.07	105.72	101.61	96.00	99.44	94.48	
31.	Lalitpur	102.50	96.42	101.33	99.17	94.07	98.86	96.75	105.09	ℓ
32.	Hamirpur	94.33	96.70	100.90	99.11	102.51	106.97	105.07	104.34	
33.	Orai	102.20	95.40	88.30	92.30	93.35	86.40	90.31	92.56	ℓ
34.	Banda	100.37	100.94	100.40	100.65	100.57	103.62	100.28	99.47	
35.	Benares	110.09	108.13	97.43	103.38	98.22	88.50	93.90	90.11	ℓ
36.	Mirzapore	94.92	103.08	93.58	98.08	108.60	98.59	103.33	90.78	ℓ
37.	Jaunpore	103.09	105.90	97.20	101.70	102.73	94.29	98.65	91.79	ℓ
38.	Ghazipore	103.00	102.18	104.88	103.82	99.20	101.83	100.80	102.64	
39.	Ballia	102.50	103.47	112.50	108.13	100.95	109.76	105.49	108.73	ℓ
40.	Parbaligarh	95.57	99.85	102.30	102.05	104.48	107.04	106.78	102.45	ℓ
41.	Lucknow (Juleilee)	104.67	103.10	106.17	104.83	98.50	101.43	100.15	102.98	
42.	Lucknow(Husainabad)	100.03	102.37	97.15	100.54	102.34	97.12	100.51	94.90	

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R.B.	Relative Rates.	Remarks.
43.	Unas	101.50	102.91	98.71	101.03	101.39	97.25	99.54	96.07	
44.	Rae Bareli	100.11	103.10	104.60	104.20	102.99	104.49	104.09	101.45	
45.	Hardoi	108.25	97.28	107.07	102.45	89.87	98.91	94.64	110.06	ℓ
46.	Sitapur	101.65	105.54	107.15	106.56	103.83	105.41	104.83	101.53	
47.	Lakhimpur	100.05	106.21	97.79	102.32	106.16	97.~~47~~ 74	102.27	92.07	ℓ
48.	Barabanki	102.11	99.33	99.75	99.81	97.28	97.69	97.75	100.42	
49.	Fyzabad	94.58	93.39	96.90	96.95	98.74	102.45	102.51	103.76	
50.	Gonda	100.93	101.59	101.00	101.56	100.65	100.07	100.62	99.42	
51.	Sultanpur	102.20	105.73	102.73	104.47	103.45	100.52	102.22	97.16	
52.	Bahraich	99.53	100.32	100.03	100.73	100.79	100.50	101.21	99.71	
53.	Gorakhpur	97.94	100.66	98.06	100.03	102.78	100.12	102.13	97.42	
54.	Deoria	90.86	90.67	92.73	91.93	99.79	102.06	101.18	102.27	
55.	Basti	97.76	94.98	96.34	95.95	97.16	98.55	98.15	101.43	

G I R L S S C H O O L S

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R.B.	Relative Rates.	Remarks.
1.	Bareilly	102.84	98.56	98.83	96.22	95.84	96.10	93.56	100.27	C
2.	Naini Tal	109.00	94.50	94.33	99.00	86.70	86.54	90.83	99.82	C
3.	Gorakhpur	92.67	89.00	90.67	90.08	96.04	97.84	97.21	101.88	

A word might be added about the method of calculating the Education Quotient or the Mean Quotient for both the subjects. In the case of each school this figure has not been obtained by taking the mean of the Mean English Quotient and Mean Arithmetic Quotient of the school. Education Quotient has been found for each individual pupil and this figure (Education Quotient for the school) has been found by taking the mean of the Education Quotient of each individual pupil. Some pupils took the English test and did not take the Arithmetic test and vice versa. Education Quotient was calculated for children who took both tests. The Education Quotient, therefore, as shown in the table will in many cases not agree with the figure obtained by taking the mean of the Mean English and Mean Arithmetic Quotient of the school.

We shall study the figures for the different schools under the following heads :-

The teaching of English.

The teaching of Arithmetic.

The teaching of both the subjects combined.

Balance between the two subjects.

For this purpose, as mentioned before, the figures for the Achievement Ratios give us the best information.

The Teaching of English.

Boys' Schools. We have so far been following the principle that any figure between 95 and 105 in the Achievement Ratios shows a satisfactory state of affairs. Confining ourselves to this principle we notice that 6 schools out of 55 have an Achievement Ratio in English which is below 95. (A figure like 94.80 has been regarded as 95). This means that in 10.91 % (or nearly 11 %) of schools the teaching of English is not keeping pace with the inborn capacity of the children. The children are working below the level of their inborn capacity.

/In 4 schools.....

In 4 schools out of 55 the Mean Achievement Ratio in English is above 105. This means that in 7.27 % (or 7 %) of schools the teaching of English is showing results which are above the inborn capacity of the children. This is not impossible. To explain this point nothing would be better than to quote Burt again.

"Achievement ratios rising over 100 per cent are occasionally met with. At first sight they may seem something of a paradox; and the examiner may begin to question the accuracy of his tests. How, he will ask, can a child possibly show achievements which are greater than his ability ? Is this not the conjuror's trick of pouring more than a quart of wine out of a quart bottle ? The explanation is that a child's achievements in school depend on many different factors. His general intelligence, which alone is considered in assessing his mental age, is only one of them, though generaly the most important. The efficiency of the teaching, the interest and industry of the child, particularly under ordinary methods of instruction, his special aptitudes, and above all his powers of memory, play at times a very considerable part. Thus if a child's powers of sheer mechanical memorization are greater than his general intelligence, an achievement ratio of 110 and 120 is by no means an impossibility; and, provided the testing can be trusted, figures like these should lead the examiner to suspect some such special influence. These high ratios, however, are undoubtedly rare. They occur sporadically in a few young bookworms who show an extra zeal or talent in academic work, but less practical shrewdness and little common sense. They occur rather more frequently, in dull youngsters who have been assiduously coached by a good teacher,

and have thus.....

and have thus been laboriously brought on, till their acquirements in the more mechanical subjects rise above what other pupils of their own meagre powers would ordinarily reach." *

The above passage explains fully the causes of these high figures. What are the real causes which in the case of a particular school makes this figure higher than 100 is a matter for further investigation, and can best be undertaken by the Headmaster of the school.

Coming back to the figures again we notice that in 45 schools out of 55 i.e. 81.82 % (i.e. nearly 82 %) of schools the work is being done satisfactorily.

Girls' Schools. In the case of Girls' Schools one out of three shows a figure less than 95 i.e. in 33.33 % of cases the work produced by children is below the level of their inborn capacity.

In 2 schools out of three the work is being done satisfactorily, i.e. in 66.66 % of cases.

Summarising these results we may say that in the case of Boys' schools

81.82 % of schools are doing work that is satisfactory.
10.91 % of schools are working below the level of the inborn capacity of their children.
7.27 % of schools are working above the level of the inborn capacity of their children.

In the case of the Girls' Schools

66,66 % of schools are doing satisfactory work.
33.33 % of schools are working below the level of the inborn capacity of their children.

Teaching of Arithmetic.

Boys' Schools. Studying the Mean Achievement Ratios in Arithmetic we notice that 4 schools out of 55 have a

---

* Burt - The Backward Child.

figure less than.....

figure less than 95. This shows that 7.27 % of schools are working below the level of the inborn capacity of the children.

9 schools out of 55 have a figure higher than 105 which shows that 16.36 % of schools are working above the level of the inborn capacity of their children.

42 schools out of 55 i.e. 76.37 % are doing satisfactory work.

Girls' Schools.

One school out of three i.e. 33.33 % of schools show a figure below 95. This means that these schools are working below the level of the inborn capacity of their children.

Two schools out of three i.e. 66.66 % of schools are doing satisfactory work.

Teaching of both the subjects combined.

Boys' Schools. 4 Schools out of 55 i.e. 7.27 % are showing a figure less than 95 which means that they are doing work below the level of the inborn capacity of their children.

5 schools out of 55 i.e. 9.09 % are showing a figure over 105 i.e. they are working above the level of the inborn capacity of their children.

46 schools out of 55 i.e. 83.64 % are doing satisfactory work.

Girls' Schools. Two schools out of three i.e. 66.66 % are showing figure less than 95 which means these schools are working below the level of inborn capacity of their children.

One school out of three i.e. 33.33 % are doing satisfactory work.

/Balance between the two.....

Balance between the two subjects.

Boy's Schools. 10 Schools out of 55 i.e. 18.18 % are emphasising Arithmetic in their teaching work.

6 out of 55 schools i.e. 10.91 % are emphasising the teaching of English.

39 out of 55 schools i.e. 70.19 % are maintaining a proper balance in the teaching of the two subjects.

Girls' Schools. All the schools are maintaining a proper balance in the teaching of the two subjects.

Matter for further enquiry.

Looking at the figures for the individual subjects or the two subjects combined we notice that quite a good percentage of schools are either working below or above the capacity of the children reading in them. This is a matter on which it is not safe to hazard an explanation without further enquiry.

Backward Children.

Finally it was found out as to what percentage of children were Backward. Before we do that it is essential that we make clear as to what we mean by Back-ward Children. We have followed Burt and it will be good to quote his definition.

> "I regard as educationally backward in the technical sense all those who in the middle of their school career would be unable to do the work of the class next below that which is normal for their age. To be exact, and to be applicable at every age, the lines of demarcation may be expressed in terms of an educational ratio. .....Accordingly in the following pages, the word 'retarded' will be used to mean any child whose educational ratio falls below 85 percent."

We have thus assumed that a child whose education quotient

is below 85.....

is below 85 is backward. Keeping this definition in mind we find that 176 children out of 1399 i.e. 12.58 are backward.*

It will be interesting to compare this figure with the studies carried out by Burt. He says "In a careful survey carried out in London just before the war, and confirmed by minor surveys since, I calculated that rather over 10 % of the total school population were definitely backward....."

".....In 1920, at the request of the Education Committee at Birmingham, Dr. Lloyed and I carried out a census of backward children in that city. The census was based primarily upon the method of sampling: typical districts and schools were selected; and from the results it was calculated that 'in all the senior departments of the Birmingham Schools, as many as 8,000 children must be technically backward'; that is, once more a proportion of about one in ten." **

From the above quotation it appears that Burt found the figure for backwardness in school children to be about 10 %. We find that our figure is considerably higher than this figure being 12.58 %. To what causes is this figure due is a matter for further investigation and would form a very fine study in itself. It is for the Education Department of the Government of United Provinces to undertake the investigation and decide what they are going to do to meet the situation.

---

* It must be remembered that children below class VI are left out.

** Burt - The Backward Child.

PART B.

Note :-

As mentioned before in this part figures are given which were obtained from the "observed" sample. As the curves were not normal it was not correct to draw any conclusions from the figures thus obtained. They are given here, however, as a matter of interest.

R E L I A B I L I T Y

1.	Intelligence	.97	(N = 214)
2.	English	.94	(N = 212)
3.	Arithmetic	.89	(N = 214)

Inter Correlations of Tests

1.	r_{EI}	=	.78	± .006	(N = 1876)
2.	r_{AI}	=	.70	± .007	(N = 1870)
3.	r_{EA}	=	.67	± .007	(N = 1871)

TABLE 35

INTELLIGENCE.

	Mean	σ	N	σ_M
1. TOTAL POPULATION	100.7	15.44	1924	0.35
SEXES				
2. BOYS	101.14	15.32	1836	0.36
3. GIRLS	91.66	15.07	88	1.61
RELIGION				
4. HINDUS	100.76	15.84	1491	0.41
5. MUSLIMS	100.67	13.97	423	0.52
CASTES				
6. BRAHMINS	101.40	15.32	390	0.70
7. KAYSTHAS	104.03	15.63	430	0.75
8. KSHATTRIYAS	98.95	15.72	247	1.00
9. VAISH	100.21	15.69	266	0.96
10. SUDRAS	91.31	11.13	47	1.62
PROFESSIONS				
1. SERVICE	102.20	15.09	918	0.80
2. LEGAL	108.01	14.14	131	1.23
3. MEDICAL	106.63	15.43	47	2.25
4. BUSINESSMEN	96.57	14.44	299	0.84
5. ZAMINDAR	99.23	15.20	167	1.18
6. CULTIVATORS	93.76	14.38	81	1.60
7. TEACHERS	106.04	15.42	65	1.91
GEOGRAPHICAL REGIONS				
1. NORTHERN HILL REGION	96.42	16.08	125	1.44
2. TARAI	98.72	15.19	462	0.71
3. WESTERN PLAINS	101.25	15.90	687	0.61
4. EASTERN PLAINS	103.10	14.80	513	0.65
5. SOUTHERN UPLANDS	99.61	14.35	137	1.23

TABLE 36

ENGLISH

	Mean	σ	σ_M
1. TOTAL POPULATION	99.889	15.9	.36
SEXES			
2. BOYS	100.429	15.7	.36
3. GIRLS	87.993	15.7	1.61
RELIGIONS			
4. HINDUS	99.469	15.9	.41
5. MOHAMMADANS	101.635	15.6	.768
CASTES			
6. BRAHMINS	100.361	16.1	.817
7. KAYASTHA	103.988	15.3	.738
8. KSHATRIYAS	96.352	16.1	1.03
9. VAISHAS	99.337	14.5	.92
10. SUDRAS	90.397	12.08	1.36
PROFESSIONS			
1. SERVICE	101.709	15.87	.52
2. LEGAL PROFESSION	109.691	15.32	1.33
3. MEDICAL PROFESSION	102.343	14.7	2.05
4. BUSINESS	94.602	14.7	.85
5. ZAMINDARI	99.128	15.45	1.16
6. CULTIVATORS	88.266	13.84	1.56
7. TEACHERS	106.274	14.09	1.79
GEOGRAPHICAL REGIONS			
1. HILL REGIONS	94.416	16.09	1.47
2. TARAI	97.292	15.36	.729
3. WESTERN PLAINS	100.534	15.77	5.97
4. EASTERN PLAINS	102.391	15.86	7.10
5. SOUTHERN UPLANDS	100.644	15.25	1.23

TABLE 37

ARITHMETIC

	Mean	σ	N	σ_M
1. TOTAL POPULATION	100.04	15.69	1907	0.36
SEXES				
2. BOYS	100.66	15.44	1820	0.36
3. GIRLS	87.03	15.40	87	1.65
RELIGIONS				
4. HINDUS	100.31	15.84	1487	0.41
5. MUSLIMS	99.46	15.00	411	0.74
CASTES				
6. BRAHMINS	99.95	15.91	376	0.82
7. KAYASTHAS	103.23	14.98	433	0.72
8. KSHATTRYAS	98.85	16.21	248	1.03
9. VAISHAS	102.16	15.48	248	0.98
10. SUDRAS	93.96	15.48	74	1.80
PROFESSIONS				
1. SERVICE	99.92	15.09	871	0.51
2. LEGAL	106.09	14.91	132	1.30
3. MEDICAL	101.83	13.73	45	2.05
4. BUSINESSMEN	98.80	15.49	298	0.90
5. ZAMINDARS	99.74	15.20	166	1.18
6. CULTIVATORS	97.60	15.59	84	1.70
7. TEACHERS	103.87	17.63	63	2.22
GEOGRAPHICAL REGIONS				
1. NORTHERN HILL REGION	94.58	16.17	122	1.46
2. TARAI	98.92	14.59	462	0.68.
3. WESTERN PLAINS	99.88	16.38	665	0.64
4. EASTERN PLAINS	102.62	15.41	504	0.69
5. SOUTHERN UPLANDS	100.02	14.81	154	1.19

TABLE 38

Significance of the differences between the means

(VALUES OF D/σ_D.)

		ARITHMATIC	ENGLISH	INTELLIGENCE
1.	Boys vs. Girls	8.07	8.08	6.35
2.	Hindus vs. Muslims	1.00	2.49	0.02
3.	Brahmin vs. Kayasthas	3.01	1.06	2.55
4.	Brahmin vs. Khattriyas	0.83	3.04	3.50
5.	Ditto vs. Vaish	1.73	0.83	1.00
6.	Ditto vs. Sudras	3.03	6.28	5.73
7.	Kayastha vs.Kshattriyas	3.48	6.02	6.77
8.	Ditto vs. Vaish	0.88	3.94	3.13
9.	Ditto vs. Sudra	4.78	8.77	1.52
10.	Kashattriyas vs. Vaish	2.33	2.17	1.31
11.	Ditto vs. Sudra	2.36	3.48	4.72
12.	Vaish vs. Ditto	4.00	5.45	4.73
13.	Service vs. Legal	4.41	5.58	3.95
14.	Ditto vs. Medical	0.90	0.30	1.85
15.	Ditto vs. Business	1.09	7.18	4.85
16.	Ditto vs. Zamidars	0.14	2.03	2.08
17.	Ditto vs. Cultivators	1.31	8.20	4.72
18.	Ditto vs. Teachers	1.73	2.99	1.85
19.	Legal vs. Medical	1.75	3.01	0.54
20.	Ditto vs. Business	4.61	9.54	7.63
21.	Ditto vs. Zamidars	3.63	6.00	5.16
22.	Ditto vs. Cultivators	3.97	10.45	7.05
23.	Ditto vs. Teachers	0.86	1.53	0.87
24.	Medical vs. Business	1.35	3.49	4.37
25.	Ditto vs. Zamidars	0.88	1.36	2.92
26.	Ditto vs. Cultivators	1.59	5.45	4.68
27.	Ditto vs. Teachers	0.68	1.44	0.20
28.	Business vs. Zamidars	0.64	3.15	1.83
29.	Ditto vs. Cultivators	0.63	3.56	1.55

/30. .....

30.	Business vs. Teacher	2.11	5.89	4.53
31.	Zamidar vs. Cultivators	1.03	5.57	2.75
32.	Ditto vs. Teachers	1.65	3.35	3.04
33.	Cultivators vs. Teachers	6.27	7.56	4.93
34.	North Hill Region vs. Eastern Plains	4.96	1.10	4.23
35.	N.Hill Region vs. Southern Uplands.	2.89	3.24	1.69
36.	Tarai vs. Western plains	1.03	0.54	2.69
37.	Ditto vs. Eastern plains	3.81	0.71	4.56
38.	Ditto vs. Southern Uplands	0.80	2.34	0.63
39.	Western Plains vs. Eastern plains	2.91	0.20	~~3.22~~ 2.08
40.	Western Plains vs. Southern Uplands.	0.10	0.02	1.~~87~~ 20
41.	Eastern Plains vs. Southern Uplands.	1.88	0.24	~~0.34~~ 2.44

TABLE 39

B O Y S S C H O O L S

Serial No.	(School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R. Both	Relation Ratio.	Remarks
1.	Saharanpore	105.62	105.79	103.14	105.66	100.16	97.65	100.04	97.56	
2.	Roorkee	102.80	98.27	100.30	100.88	95.59	97.57	98.13	97.57	
3.	Meerut	102.60	100.67	98.96	100.67	98.12	96.45	98.12	98.30	
4.	Hapur	94.32	93.00	102.16	98.94	98.60	108.31	104.90	109.85	
5.	Bulandshahr	99.58	100.96	94.68	98.54	101.39	95.08	98.95	93.78	
6.	Bijnor	101.34	99.83	102.86	101.95	98.51	101.50	100.60	103.03	
7.	Najibabad	92.30	85.70	94.71	90.70	92.85	102.60	98.27	110.51	
8.	Srinagar(Garhwal)	92.20	90 .11	93.50	94.26	97.72	101.41	102.23	103.76	
9.	Lansdowne	96.37	99.57	94.69	99.47	103.32	98.26	102.18	98.10	
10.	Aligarh	100.07	101.36	94.67	98.76	101.29	94.60	98.69	93.39	
11.	Hathras	95.71	100.22	94.29	98.91	104.71	98.52	103.34	94.08	
12.	Muttra	110.06	109.69	104.50	107.25	99.66	94.94	97.45	95.26	
13.	Agra.	104.02	102.22	100.89	102.00	98.17	96.99	98.06	98.70	
14.	Mainpuri	100.08	101.00	94.04	100.75	100.92	93.96	100.67	93.12	
15.	Etah	105.44	105.40	101.28	103.56	99.96	96.05	98.22	96.09	
16.	Farrukhabad	97.45	99.73	102.33	102.32	102.40	105.01	105.00	102.61	

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R. BOTH	Relation Ratio.	Remarks
17.	Fatehgarh	109.78	108.68	107.34	108.80	98.09	97.78	99.11	98.77	
18.	Etawah	100.97	98.17	98.13	98.38	97.23	97.19	97.43	99.96	
19.	Bareilly	97.00	103.57	95.75	102.14	106.77	98.71	105.30	92.45	
20.	Budaun	100.43	108.35	101.72	106.58	107.89	101.29	106.42	93.88	
21.	Muradabad	104.60	103.48	105.67	104.63	98.93	101.02	100.03	102.12	
22.	Amroha	98.58	103.39	104.88	105.55	104.88	106.39	107.06	101.44	
23.	Shahjahanpur	104.00	103.56	97.05	102.31	99.58	93.32	98.38	93.71	
24.	Pilibhit	101.00	98.49	100.71	100.33	97.51	99.71	99.34	102.25	
25.	Nainital	103.22	108.11	100.97	105.85	104.74	97.82	102.55	93.40	
26.	Almora	103.00	105.78	110.40	109.11	102.70	107.18	105.93	104.37	
27.	Cawnpore	101.92	100.03	98.57	99.59	98.15	96.71	97.71	98.54	
28.	Fatehpore	98.87	104.68	102.69	104.23	105.88	103.83	105.42	98.06	

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R. BOTH	Relation Ratio.	Remarks
29.	Allahabad	106.28	100.50	102.97	106.96	104.91	96.89	100.64	92.35	
30.	Jhansi	106.72	108.32	103.31	106.19	101.50	96.80	99.50	95.37	
31.	Lalitpur	98.54	94.23	98.17	97.86	95.63	99.62	99.31	104.18	
32.	Hamirpur	94.61	95.56	96.73	98.14	100.00	102.24	103.73	101.22	
33.	Orai	101.73	100.33	96.67	96.50	98.62	95.03	94.86	96.35	
34.	Banda	102.07	102.93	102.18	103.751	100.84	100.11	101.42	99.27	
35.	Benares	113.34	112.68	102.00	107.86	99.42	89.99	95.16	90.52	
36.	Mirzapure	99.81	108.14	100.07	103.92	108.35	100.21	104.12	92.54	
37.	Jaunpore	102.86	108.58	99.53	105.45	105.56	96.74	102.52	91.67	
38.	Ghazipore	102.03	102.65	102.17	103.42	100.68	100.14	101.39	99.53	
39.	Ballia	106.38	106.61	103.16	110.25	100.22	106.37	103.64	106.14	
40.	Partaligarh	95.87	101.64	99.97	101.27	106.01	104.27	105.63	98.35	
41.	Lucknow (Jubilee)	106.00	104.36	106.69	107.31	98.45	100.65	101.23	102.23	
42.	Lucknow(Husainabad)	102.90	105.30	100.41	104.25	102.33	97.58	101.31	95.35	

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R. BOTH	Relation Ratio.	Remarks
43.	Unas	101.62	104.68	101.12	104.15	103.01	99.50	102.48	96.59	
44.	Rae Bareli	102.64	104.75	105.46	105.75	102.05	102.74	103.03	100.67	
45.	Hardoi	107.95	101.08	108.00	106.19	93.63	100.04	98.36	106.84	
46.	Sitapur	102.02	107.86	107.00	107.92	105.72	104.88	105.78	99.20	
47.	Lakhimpur	102.08	108.05	100.74	104.77	105.84	98.68	102.63	93.19	
48.	Barabanki	101.45	100.91	99.87	101.24	99.46	98.44	99.79	98.96	
49.	Fyzabad	97.59	97.70	100.00	101.33	100.11	102.47	103.83	102.38	
50.	Gonda	98.12	98.65	98.20	100.36	100.54	100.08	102.28	99.54	
51.	Sultanpur	104.00	105.20	104.50	105.15	101.15	100.48	101.10	99.33	
52.	Bahraich	100.23	103.46	100.41	103.68	103.22	100.17	103.44	97.05	
53.	Gorakhpore	99.74	104.66	101.31	103.78	104.73	101.58	104.05	96.79	
54.	Deoria	95.26	94.60	94.29	95.40	99.30	98.98	100.14	99.67	
55.	Basti	96.66	96.37	95.28	97.54	99.70	98.57	100.91	98.86	

G I R L S S C H O O L S

Serial No.	School at (City)	Mean I.Q.	Mean E.Q.	Mean A.Q.	Mean Quotient BOTH	Mean A.R.E.	Mean A.R.A.	Mean A.R. BOTH	Relation Ratio	Remarks
1.	Fatehgarh	82.30	79.50	71.75	80.00	96.60	87.18	97.21	90.25	
2.	Bareilly	99.75	100.43	97.56	101.64	100.68	97.80	101.89	97.14	
3.	Naini Tal	99.29	88.46	78.69	87.44	89.10	73.21	88.01	88.95	
4.	Shahjahanpur	85.09	78.00	82.69	79.50	91.67	97.18	93.43	106.01	
5.	Benares	88.00	81.67	85.20	83.20	92.81	96.82	94.55	104.32	
6.	Fyzabad	98.00	98.00	93.00	86.00	100.00	94.90	87.80	95.00	
7.	Gorakhpore	93.65	93.50	88.68	92.41	99.84	94.69	98.68	94.84	